THE INDUSTRY'S RECOGNIZED AUTHORITY

ROCK PRODUCTS

MARCH 1952

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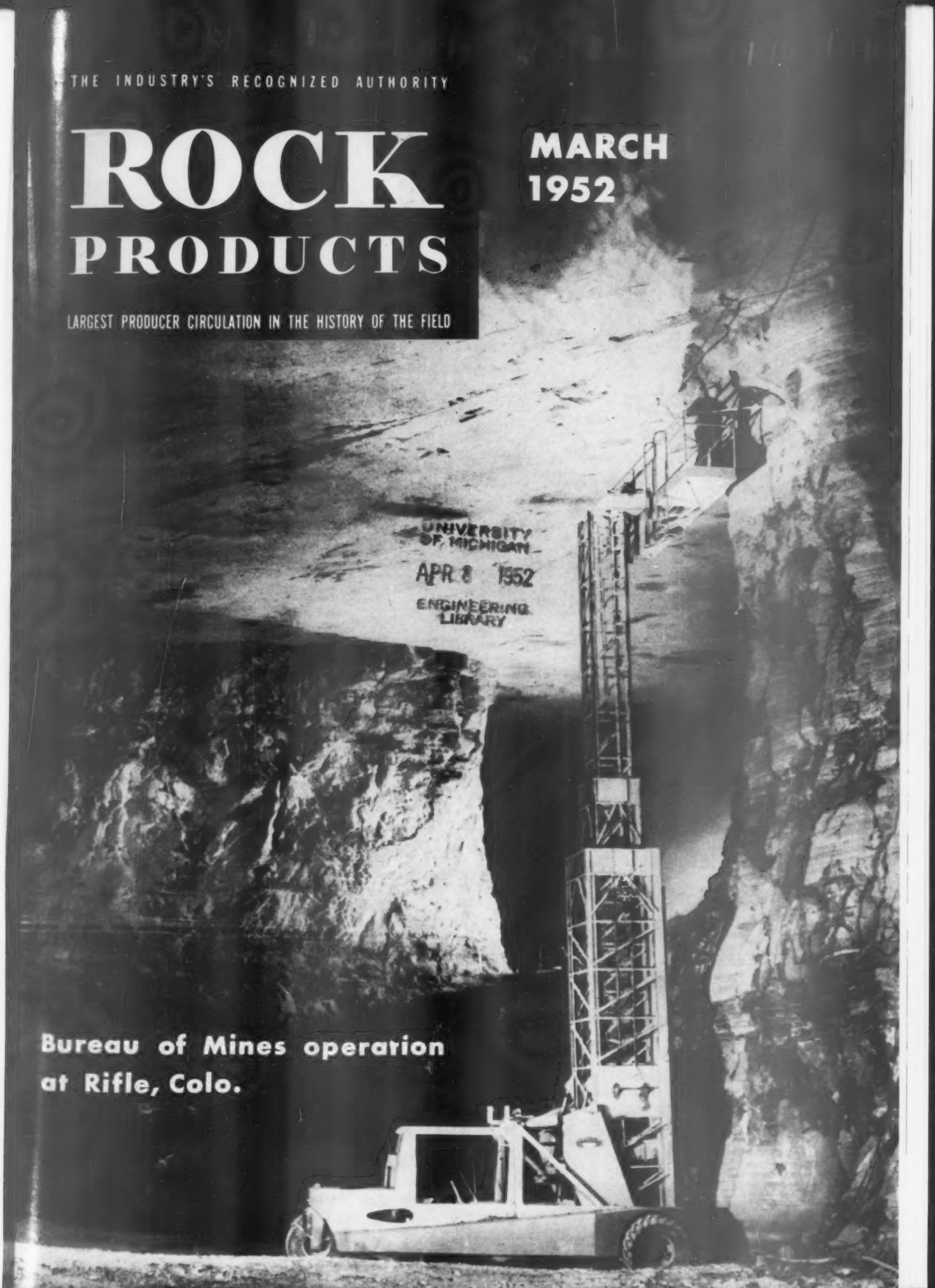

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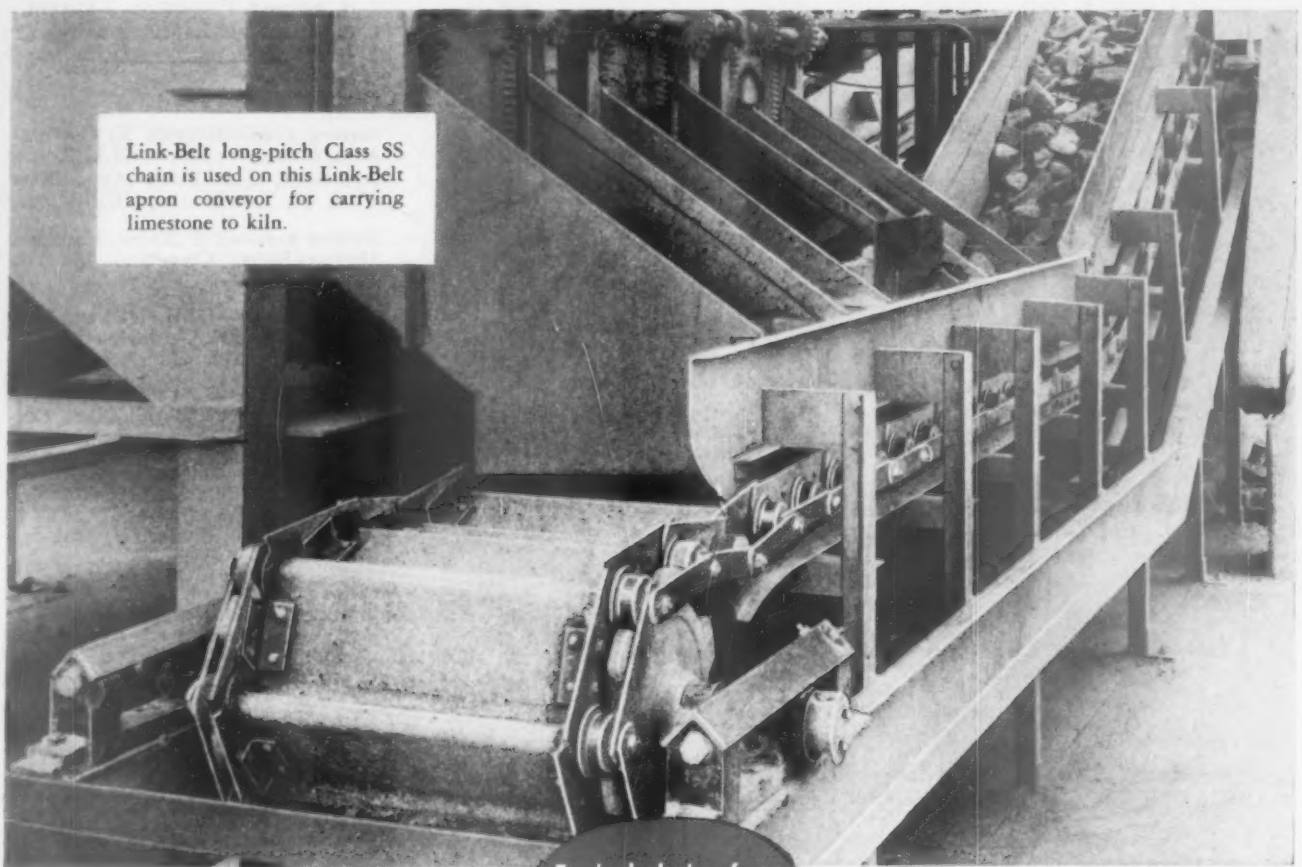

Link-Belt long-pitch Class SS chain is used on this Link-Belt apron conveyor for carrying limestone to kiln.

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Class SS bushed roller chain with straight sidebars —for practically any conveying or elevating service.

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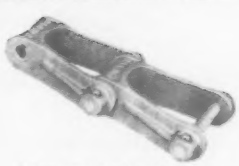

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MARCH, 1952

ROCK PRODUCTS

THE INDUSTRY'S RECOGNIZED AUTHORITY

VOL. 55, No. 3

Bror Nordberg
Editor

Nathan C. Rockwood
Editorial Consultant

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"WE HEAR..."

March, 1952

A 200-ft. high "sand" mound, composed of 3,000,000 tons of sand washed from phosphate diggings at a flotation plant near Fort Meade, Fla., and said to be the world's largest "man-made" mountain, is expected to become a tourist attraction for a brand new sport--sand skiing. The phosphate company began building the sand pile in 1948, merely as a means of disposing of the phosphate sand residue. A conveyor belt carries the wet sand from the plant to the mound, adding about 4000 tons every 24 hr. Plans are being made by Fort Meade Chamber of Commerce members to convert the sand pile, extending over about 18 acres, into a "Florida Sun Valley."

* * * * * * * * * *

In January, the steel scrap supply situation reached its lowest point since World War II days, as was reported in The Wall Street Journal. Because of this acute shortage, U.S. Steel Co. was forced to shut down its open-hearth furnaces at the Gary, Ind., plant, which resulted in a loss of steel ingot production of 1600 t.p.d.

* * * * * * * * * *

Railroads in 1951 made all-time record expenditures for new equipment and other improvements which helped to bring about further enlargement of carrying capacity and greater operating efficiency, as was stated in the year-end report by the president of the Association of American Railroads. He stated that the railroads also carried a near record traffic of 643 billion ton-miles, and took in record gross operating revenues of more than $10 billion. But expenses and taxes were also at record levels and railway operating income fell from $973,000,000 in 1950, to $903,000,000 in 1951.

* * * * * * * * * *

Seeking to eliminate state-owned ferries operating between Norfolk and Newport News, the Virginia State Highway Department had planned to build a $42,000,000 bridge tunnel, but ran into opposition from the Navy and the U.S. Army Corps of Engineers, according to Engineering News-Record. The project included a viaduct across Norfolk Naval Base which, according to the Navy, would threaten naval security. Army engineers objected that commercial shipping might be affected. The highway department now is seeking another location.

* * * * * * * * * *

Technicians of the Highway Research Laboratory of Arkansas University's engineering experiment station are working to develop a more durable asphalt patching mixture which, it is hoped, will last the lifetime of the highway and also be more stable in roadside stockpiles. The aim is to develop a mixture that will be more simple, easier to make, dry out less rapidly and that will utilize materials available in the vicinity where the patching material is needed. Various types of crushed stone from all sections of the state are being tested as possible aggregates. It is estimated that the research findings will save the state, every year, more than the entire cost of the two-year project.

* * * * * * * * * *

A personnel officer of an Ohio city highway department recently resigned his position after being charged with using state-owned materials and labor in building his new house. The defendant admitted violating highway department rules by using state cement in the foundation of his house, but claimed he only "borrowed" the cement from state stockpiles when he was unable to get it from private sources and that he had been replacing the material whenever he could purchase more on the market, and that the highway employes working on the house were doing so on their own and not state time. The six employes involved had been given temporary suspensions, but were later reinstated when cleared of any guilty action.

WE HEAR

Heavy construction awards totaled $1,363.9 million, nationally, for the first six weeks of 1952, which was a 34 percent decrease from the corresponding period in 1951, but still 12 percent ahead of the comparable 1950 period, as reported by Engineering News-Record. Private housing awards are running 17 percent ahead of 1951, with a total of $301.0 million reported for the first six weeks. Highway awards are also up 24 percent.

* * * * * * * * * *

A study of the Missouri state highway system to determine what effect different loads have on roads has been announced by the state's highway commission. Parts of 19 roads in 34 counties will be used as test areas.

* * * * * * * * * *

Great Lakes shipments to the Port of Cleveland in 1951 showed increased tonnages in limestone, iron ore and petroleum products. Limestone cargoes increased 33 from the preceding year to a total of 259 cargoes, or approximately 2,590,000 gross tons. Sand deliveries of 235 cargoes were about the same as those of 1950. Coal and steel shipments from Cleveland dropped considerably from those shipped in 1951.

* * * * * * * * * *

The New Jersey State Appellate Division recently upheld a lower court order directing three cities to stop dumping sewage into the Hudson river and to build new sewage treatment plants. The court stated that cutbacks on nonessential construction under the defense program are no excuse to abandon sewage disposal plans that should have been completed long ago.

* * * * * * * * * *

The proposed $310,000,000, 240-mile Ohio Turnpike is being threatened by a volume of amendments, objections and opposition. A special legislative session had been called to change eminent domain sections of the turnpike act to speed financing and permit early construction. An amendment has been proposed which would permit prompter possession of right-of-way land. Another proposed amendment would require the turnpike commission to get city approval before routing a toll road through municipalities--many cities are opposing the routing of the turnpike because of damage to sewer and other utility systems, and to parks, schools and churches. Another roadblock is the asphalt lobby which is seeking to require competitive bidding on all types of paving materials. (The turnpike commission had already voted unanimously to build the road of concrete.) Supporters of the asphalt lobby maintain that such bidding would force concrete firm bids down at least 25 percent, and that if asphalt paving were chosen, it would eliminate the 200,000 tons of steel required for the concrete paving.

* * * * * * * * * *

The Portland district of the Corps of Engineers is making a series of tests to determine the effect of high flows of water on dumped stone riprap, used as revetment in connection with bank protective works, as recently reported in Engineering News-Record. To test the riprap, large quantities of water are released from the Dorena reservoir at stated periods and the riprap is checked closely for displacement, while measures of the water velocities are recorded. Results of the tests will be made available to other engineering districts throughout the United States.

* * * * * * * * * *

In a state-wide anti-pollution drive, thirty Ohio cities have been asked to begin sewage treatment facilities or face court action. Most of the cities are complying and have already started procedures for financing the projects and drawing up construction plans. Plans are underway for a $30,000,000 project in the Mahoning river valley, which includes a $10,000,000 disposal system in Youngstown, and a $6,000,000 system in Warren; a $2,800,000 project is underway at Tiffin. Other cities planning projects include Zanesville, Lorain, Miamisburg, Defiance, Athens, Dover, New Philadelphia, Cambridge, Niles and Middletown.

* * * * * * * * * *

Total construction contract awards in 1951 for the 37 states east of the Rockies amounted to $15,751,131,000, or 8 percent more than 1950's total of $14,501,055,000, according to an F. W. Dodge Corp. report. Nonresidential awards totaled $6,822,513,000, or 31 percent above the 1950 total. Residential contracts of $6,205,388,000 were, however, 8 percent below the 1950 figure. Public and private works and utilities totaled $2,723,230,000, or 6 percent higher than the previous year.

THE EDITORS

*Editor's page.....

Industry's Obligations and Rights in Public Affairs

ONE COMMON CONCLUSION came out of the five national conventions which we attended this past month—that the rock products and concrete products industries have far greater obligations than just the solution of day-to-day problems.

It was driven home in business sessions and by public-spirited speakers that industry and the public can no longer remain apathetic to public affairs but must actively join the fight to maintain free competition and opportunity.

The trouble is that most of us shun responsibilities for public affairs because we are too busy with daily problems; yet, the existence of free enterprise cannot be guaranteed if we continue, by default, to pass on to social scientists and planners the solutions to our economic and political problems. They and politicians have been quick to exploit this weakness, of being lulled into an attitude of indifference, with the result that our society is not certain of its future.

Need for participation in national and local affairs was obvious from discussions of industry problems at the conventions. The menace of the gigantic bureaucracy built up in Washington to impose price controls over thousands of industries, as an example, was clearly defined. Many producers of ready-mixed concrete were forced to operate at a loss, by government order, for many months before price relief came, to compensate for the higher cost of out-of-area cement required because of the cement shortage.

Relief finally came begrudgingly, months too late, and only after great pressure on the top brass in Washington. That cement from distant sources carried a premium price tag too, because the government has failed to clarify the legality of freight absorption by the cement industry.

In the arbitrary refusal by N.P.A. to allocate realistic quantities of structural steel for highway construction, unquestionably vital to both the defense and civilian economy, we have another example of how it is politically expedient for top men in a bureaucracy to deny relief even for the most meritorious cases. The control mechanism in a bureaucracy, such as we have, is highly centralized; and arbitrary, unrealistic, rules are being imposed and industries forced to fit rules that do not apply.

Furthermore, we are spending up to 25 percent of national income now, in a semi-peace economy, and prospects are that controls over most everything will be extended well beyond 1953. Many small concerns, which make up the bulk of these industries, and the marginal producers, face a dim prospect as the differential between ever-increasing costs and controlled prices is drawn tighter.

A study of year-end stockholders' reports by corporations brings a shocking revelation of how free enterprise is being stifled. All-time sales records and peak earnings, before confiscation by taxes, are reflected in reduced earnings to owners that make investment extremely hazardous.

There is no question but that waste and corruption must be stopped and that it is the responsibility of all of us that government spending and financial policies be critically examined, with the objective a return to a strong economy on a pay-as-you-go basis.

These adverse trends require action at the political level for results, which means voicing strong and specific disapproval and expression of recommendations to Congressmen and Senators on all vital issues of national significance. We still have a representative form of government and, during an election year, even the bureaucrats are sensitive to public pressures. There has been proof recently, right in these industries, that employers do have rights if they will fight for them. Favorable decisions granting percentage depletion and price relief (although long delayed), and judgments in labor matters have resulted through pressure in meritorious cases. In every instance, the great need for more of a job of public relations —telling the industry story—is indicated as the key to persuasive pressure.

What is needed most now, aside from expedient political action, was summed up by president H. N. Snyder before the National Sand and Gravel Association convention. He urged support to all organizations that teach moral and spiritual values and that all of us vote and get out the vote. Referring to the fact that only one-half the eligible voters cast their votes in the last presidential election, he said, "We need not fear majority rule of those eligible to vote but we can well fear that a majority of one-half the eligible voters may represent the element that thinks we should adopt some form of socialistic, welfare or totalitarian government and thus be under the rule of a minority." Those words should be taken to heart by all who criticize the way things are going.

Bror Nordberg

Steel

BULWARK OF FREEDOM, BUT . . .
THE STEEL INDUSTRY
NEEDS YOUR HELP

Blast furnaces are today operating at capacity.

The product of a blast furnace is pig iron.

The only substitute for pig iron is scrap. The only way to maintain present steel production, or to increase steel production, is to find more scrap.

All industry has it within its power to provide extra scrap by abandoning and "scrapping" obsolete units. Extra scrap has been provided through this means in scores of plants throughout the nation.

Have you done so in your plant or shop? Every ton of scrap you provide at this time will mean an extra ton of steel which you may need.

Action now, however, is important. Don't leave it to the other fellow. Will you inaugurate a search for obsolete equipment and scrap in your shop?

The entire steel industry will appreciate your cooperation.

SHEFFIELD
STEEL
CORPORATION
HOUSTON KANSAS CITY
TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

EVERY TON OF SCRAP
RECEIVED BY SHEFFIELD
WILL MEAN MORE OF
THE FOLLOWING PRODUCTS

Plates, Sheets, Merchant Bars, Structural Shapes, Steel Joists, Reinforcing Bars, Welded Wire Mesh, Wire Rods, Fence, Barbed Wire, Spring Wire, Nails, and other Wire Products, Rivets, Grinding Media, Forgings, Track Spikes, Bolt and Nut Products.

Rocky's NOTES

Nathan C. Rockwood

A Year of Notable Anniversaries

THIS YEAR OF 1952 is an historical one for the rock products industries in more ways than one. It marks the 100th anniversary of the founding of the American Society of Civil Engineers, which will celebrate with all its offshoots in various branches of engineering at a World Congress of Engineering in Chicago, this coming summer. Also this summer, in New York City, will be the 50th anniversary convention of the American Society for Testing Materials.

These two technical societies have played an important role in our rock products industries, since they have always assumed a superior knowledge of the materials of construction, which climaxed in their writing specifications that really instruct the manufacturers on how to make these products —not always, it seems to us, viewed in retrospect, with unqualified success.

The year 1952 also marks the 50th anniversaries of the founding of the Association of Portland Cement Manufacturers, which subsequently developed into the Portland Cement Association, and of the National Lime Manufacturers' Association, which finally emerged as the National Lime Association.

According to Robert W. Lesley's "History of the Portland Cement Industry," the first meeting of a group of portland cement manufacturers came together in Philadelphia in September, 1902, to discuss the problem of handling or interchange of the cloth sacks in which portland cement was then universally shipped. Out of this meeting grew an organization that culminated in 1916 in the organization of the Portland Cement Association, which from its start restricted its activities to promoting the use of cement and concrete, and research in connection with this objective. The first meeting of a group of lime manufacturers, with the object of organizing a national association, was held in Cincinnati, Ohio, in October, 1902.

The founding of the National Lime Manufacturers' Association is of particular interest to us on the staff of ROCK PRODUCTS, because it was in April of the same year, 1902, that our journal itself was founded in Louisville, Ky., by E. H. Defebaugh. However, we celebrated our 50th anniversary in 1946, because it is the custom of business journals which are consolidations of various prior independent publications to count their birthdays from that of the oldest increment. That happened in our case to have been *Cement and Engineering News*, which was founded in Chicago in 1896. It was Mr. Defebaugh who conceived the name ROCK PRODUCTS and visualized a comprehensive industry long before anybody else did.

Natural Born Organizer

Mr. Defebaugh was already the publisher of a trade journal called *Barrel and Box*, and presumably he first became aware of the lime industry as a customer of his cooperage manufacturer friends. Defebaugh was a dynamic individual who never did things by halves. He was probably a better promoter and organizer than a publisher. Unlike many trade paper publishers of his day he was not jealous of trade association activities as competitive with his publishing activities. Just the opposite; for he no sooner was publishing a trade journal than he took the initiative in organizing the industries served into associations. Moreover, he was vociferous both in his journal and his speeches to various organizations in stating that his object was to get better prices and make the industries served more profitable.

So, it was Mr. Defebaugh, within six months after founding ROCK PRODUCTS, who issued the first invitation to prominent lime manufacturers to meet with him at Cincinnati to take the first step toward a national association. Of that original group there is but one survivor. He is Charles Warner, chairman of the board of directors of the Warner Co., Philadelphia, Penn., who was by far the youngest executive of a lime manufacturing enterprise in the country at that time. So far as we can determine there are no survivors among the founders of the Association of Portland Cement Manufacturers.

Epic of American Industry

As successor to Mr. Defebaugh, coming to ROCK PRODUCTS in 1917, we naturally took a very special interest in the lime industry and the national association of the industry. Recently, we have been reading the early *Transactions* of the association, to have a better background for the 50th anniversary convention to be held at Hot Springs, Va., next May. What has impressed us the most is that here in 1902 was a group of American business men who exemplified to the nth degree the independence and the rugged individualism, yet the spirit of cooperation, which we like to believe best represents the typical American. They thrashed out their problems in public but were slow to yield any of their prerogatives as individuals.

The lime industry in 1902 comprised some 750 plants, more or less, scattered over the entire length and breadth of the land. Some of these plants consisted of little more than two or more crude stone kilns. Often they were operated intermittently by the proprietor and his sons, or as a sideline to family farm operations. Little capital was needed if there was a limestone quarry and a woodlot for fuel. The few manufacturers who were then trying to make lime a real industry were beset with more than the usual difficulties. Ancient as their industry was, up to that time it was hardly recognized as an industry. In fact in Clark's "History of Manufacturing in the United States," the most complete work of its kind, published in 1929, there is no mention of lime manufacture as an industry. Lime is mentioned a few times as a necessity to glass, sugar and some other manufactures.

The year 1902 was in the midst of one of the longest periods of tranquility that the United States has enjoyed. Production in all lines was going up and prices were coming down. The national debt was paid off. In those days we all believed in balanced budgets, both governmental and individual. Hence there was comparative peace in labor-management relations. There certainly was no hint of regimentation by the federal government. The Sherman anti-trust law was on the books, but apparently it had not reached down to the smaller units of industry such as lime manufacturers, because they did not hesitate to discuss prices and profits in open meetings. In fact none of the early conventions failed to take up the absorbing subject of how to get more money for their products.

Then came J. P. Morgan with his organization of United States Steel Corp., as a legitimate way to get around the anti-trust laws, and the imaginations of lime manufacturers were fired by the possibilities of forming a U. S. Lime Corp. The gypsum plaster industry, although with the advantage of fewer plants, which was in even worse shape than the lime industry, did corral about three-fourths of the industry's production in the United States Gypsum Co. also in

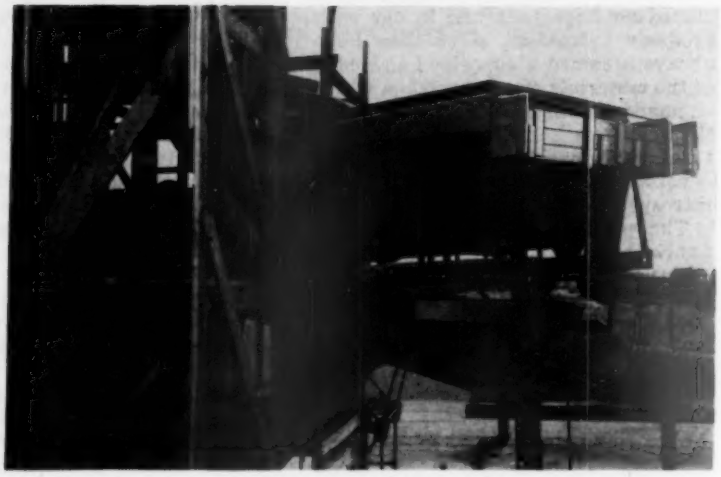
(Continued on page 109)

EAGLE EXPERIENCE SOLVES ANOTHER

AGGREGATE WASHING-CLASSIFYING PROBLEM

THIS TIME IT'S MAC KENZIE SAND & GRAVEL CO.

CLIFTON SPRINGS, N.Y.



Eagle pioneered the modern concept of aggregate washing and classifying and because of the great number of successful plants — coast to coast — using Eagle equipment, we have become "Headquarters" for Washing, Classifying and Dehydrating Equipment.

For example, MacKenzie Sand & Gravel Co. produces road stone, aggregate, concrete sand and mason's sand. Plant capacity is 250 tons per hr. Dry material is conveyed to a 3 deck 3'8" wet screen. Material passing through the screen is sluiced to an Eagle 12' Water Scalping Tank. Here, excess water is scalped off and solids are concentrated, flowing through two bleeder valves in bottom to the collecting flume below tank. Flume deposits material in feed box of a 24" Eagle Fine Material Screw Unit. This combination of Eagle Water Scalping Tank and Washer Classifier-Dehydrater gives MacKenzie a premium product that meets local specifications. Cost is insignificant considering results. No doubt Eagle's experience can help solve your problem. Contact headquarters today!

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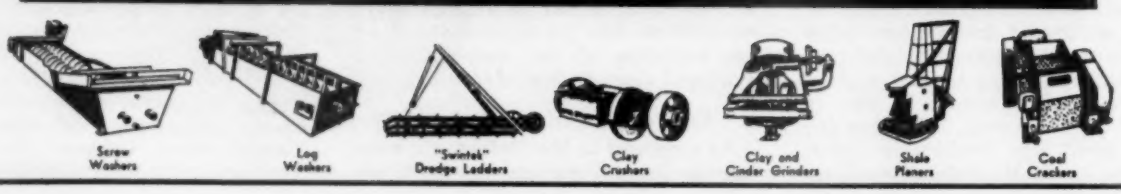

LABOR RELATIONS TRENDS

More Defeats for Operating Engineers' Union in Rock Products Plants

By NATHAN C. ROCKWOOD

JUST ONE YEAR AGO in our March, 1951, issue we reported at some length a decision of the National Labor Relations Board against the International Union of Operating Engineers in a case involving its use of coercion in the demotion of an employe of the Peerless Quarries, Inc., Turner, Kan. The company is a considerable producer of crushed stone for all purposes. The employe was a fully competent operator of a tractor loader machine and a member of Hod Carriers' Union, with which the Operating Engineers' Union is affiliated in many labor contracts. The employe involved happened to be a Negro, which fact, however, did not directly enter into the case except that it was apparently the only reason he could not become a member of the Operating Engineers' Union. Because he held what the Operating Engineers' Union contended was a skilled worker's job, he must, according to the contract with the employer, be a member of their union.

This employe being unwilling to give up his better-paying job voluntarily, the union threatened a walkout unless the employer demoted him to an unskilled laborer's job, the company was thus compelled to give this employe a lower-paid job as a quarry truck driver. He took his case to the nearest office of the National Labor Relations Board, and the board could hardly do otherwise than decide in his favor, under the specific terms of the Taft-Hartley Act, which was designed to protect just such employes from labor union bosses against all kinds of unjust discrimination. The color line was not at issue; it was merely that while a member in good standing of the Hod Carriers' Union, the employe was not (and under its constitution could not be) a member of the Operating Engineers' Union.

The N.L.R.B. investigation brought out the fact that the employer's contract, with the Operating Engineers' Union, was illegal under Section 8 (a) (3) of the Taft-Hartley Act which makes it an unfair labor practice for a labor organization to discriminate against an employe with respect to whom membership in such organization has been denied or terminated on some ground other than his failure to tender periodic dues and initiation fees uniformly required as a condition of acquiring or retaining membership. Moreover, the union security provisions in the contract were worthless, because, before the act was recently amended, a prior election to authorize such a contract must have been held. The N.L.R.B.'s decision forbade the company from doing any further business with the Operating Engineers' Union until it could make a valid contract, and it held the company and the union jointly and severally responsible for making good the wages lost by the demoted employe.

The case did not end there, for apparently the Operating Engineers' Union was still able to exert enough pressure on the employer to prevent him from restoring the demoted employe to his skilled job alongside the members of the Operating Engineers' Union. The N.L.R.B. therefore had to go to the U. S. Circuit Court of Appeals, tenth circuit, Denver, Colo., for an order to enforce the order. The court's ruling was handed down December 31, 1951, and presumably closes the case. If the members of the Operating Engineers' Union should now walk off the job because they have to work with this unfortunate man, they would be guilty of contempt of court, and could go to jail.

Board's Jurisdiction

This is the same Circuit Court of Appeals that has been rather severe on the N.L.R.B.'s broad claims of coverage of industries related to construction. Perhaps that is the reason the board took such a flagrant case to it; for a decision here must of course involve the board's jurisdiction of this kind of a local enterprise. The court decided the N.L.R.B. did have jurisdiction, in these terms: "The company, a Kansas corporation, mines, crushes, manufactures, and sells limestone and asphalt paving materials at its place of business in Turner, Kan. The record shows that during 1949 the company sold and shipped by truck and railroad, materials valued at more than $40,000 to points outside Kansas. This figure represented approximately 9 percent of its total sales. The company made additional sales totaling at least $150,000 to concerns engaged in interstate commerce. These sales, made locally to concerns whose business affected commerce within the meaning of the act, constituted 37 percent of its total sales. During the same year, the company purchased supplies and repair parts worth about $26,000 from outside the state of Kansas or about 60 percent of its total purchase of supplies and materials. Early in 1950 the company purchased the component parts of an asphalt plant costing approximately $100,000 from sources outside Kansas. The company later in 1950 sold the total production of its asphalt plant, or 450 tons daily, to a company which used such products on a paving project in Kansas City, Mo. These facts are sufficient to sustain the board's finding that the company's operations affected commerce within the meaning of the act, and are sufficient to bring the company within the jurisdiction of the board."

The court found that N.L.R.B. had accurately determined the facts and directed that its order be carried out.

Another Illegal Contract

The second case involving a rock products producer was decided by the National Labor Relations Board on January 28, 1952. This concerned a contract between the Herdon Rock Products, Fresno, Calif., and the Operating Engineers' Union, that sought to be bargaining agent for several employes who were members of the International Association of Machinists, which, incidentally, is also an A. F. of L. union. The Machinists' Union which had done its own bargaining with the employer sought to continue in that capacity by petitioning the board for certification to authorize its right to do so. Subsequent to the filing of the petition, the employer joined a construction employer group which makes a uniform contract for all its members with the Operating Engineers' Union and other affiliated labor unions in the construction industry. The decision of the N.L.R.B. reads in part as follows:

"The employer is engaged in the production and sale of rock, sand and gravel, and related construction materials and in general contracting and construction work. Its main office and operations are conducted in Fresno, Calif., but it also operates two gravel pits a few miles away. In addition, the employer is engaged in construction work in connection with a major project in Goshen, Calif.

"Petitioner is now and has been for several years the recognized bargaining agent of machine maintenance and repair men. This proceeding, therefore, rests essentially on the petitioner's desire to obtain the benefits of a certification.

"The employer and the intervenor (International Union of Operating Engineers) contend that the petition should be dismissed to the extent that the petitioner seeks to represent employes engaged in repair work at the gravel pits and at the Goshen site, on the ground that these employes are covered by existing contracts between the employer and the intervenor.

"One of these contracts, purportedly covering the repair work at Goshen, was executed on May 1, 1951, by an employer association and the intervenor. At that time, the employer was only an associate member of this group and was not bound by any of the labor contracts negotiated by the organization. The employer did not become a member of the organization until August 6, 1951, or four days after the petition herein was filed. There is no merit in the employer's contention that this contract is a bar on the theory that the contract itself by its terms applies to present and future members. A contract may not

(Continued on page 109)

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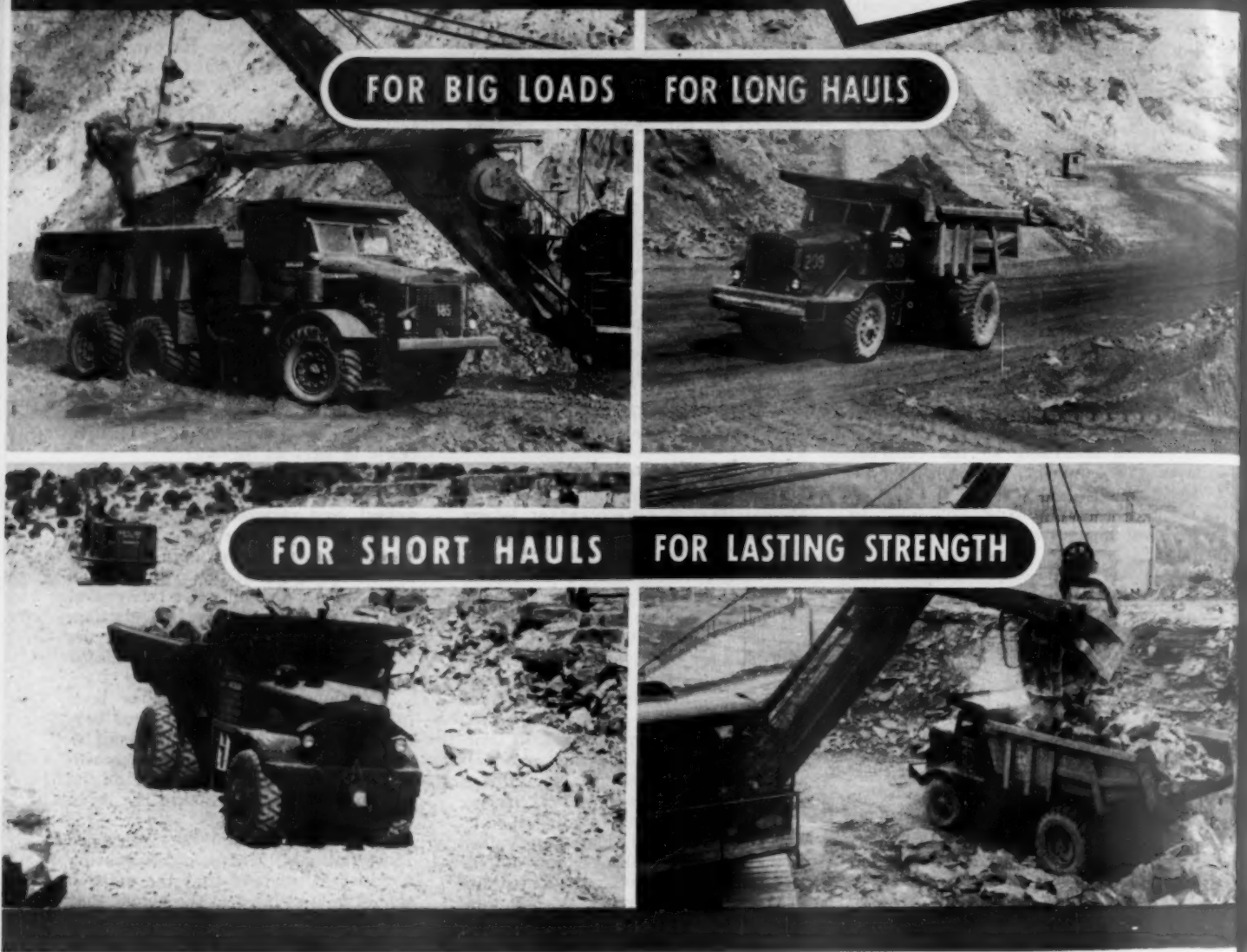

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PEOPLE in the news

Universal Appointments

MAC H. HULL, formerly assistant to vice-president of general sales, and James C. McClure have been appointed assistant vice-presidents of Universal Atlas Cement Co., New York, N. Y. Mr. McClure was formerly sales

Mac H. Hull

manager of the Dayton, Ohio, territory, and will be succeeded in this position by David H. Deacon, who has been assistant sales manager at Dayton. Carroll E. Aldrich, plant engineer at Duluth, has been appointed assistant plant manager.

Mr. Hull was born in Portsmouth, Ohio, and received his early education in Birmingham, Ala., where he attended Howard College. He has been associated with Universal Atlas for 31 years, having joined the company as correspondent at Birmingham in 1921. He served in various capacities in the sales department at Birmingham and also Waco, Texas, until 1938, when he became district sales manager at St. Louis, Mo. In 1940, he was appointed assistant to vice-president of sales, central region, Chicago, and in 1946 was named assistant to vice-president of general sales, New York.

Mr. McClure, a native of Tipp City, Ohio, and a civil engineering graduate of Ohio State University, joined the company in 1927, serving as technical service engineer in Ohio until 1935, when he was promoted to tech-

James C. McClure

nical service manager at Pittsburgh. In 1938, he was appointed district sales manager at Albany, N. Y., and in 1946, sales manager at Dayton, Ohio. He is a member of the American Concrete Institute and the Ohio Society of Professional Engineers.

Mr. Deacon was born in New York City and attended New York Univer-

David H. Deacon

sity and the American Institute of Banking. He joined the company in 1941 as clerk in the Albany, N. Y., sales office. He became a salesman the following year and two months later joined the U. S. Army Air Force. Discharged as a captain in 1946, he rejoined the company as sales representative in the Albany office and six months later was assigned to the Dayton, Ohio, sales office as sales representative. He was appointed assistant sales manager at Dayton in 1949.

Mr. Aldrich was born in Veblen, S. D. He received his early education in Duluth, Minn., and attended Duluth State College where he majored in chemical engineering. He joined the company in 1946 as turn chemist at the Duluth plant. Later the same year he was promoted to chemist. In 1948, he was transferred to the Leeds, Ala., plant as assistant technician and was appointed general operating fore-

Carroll E. Aldrich

man in 1950. He has been plant engineer at Duluth since 1951. During the war, Mr. Aldrich served as a pilot in the Navy Air Corps.

Heads Bureau of Mines

JOHN J. FORBES has been appointed director of the U. S. Bureau of Mines, Washington, D. C., succeeding James Boyd, who resigned to become vice-president of Kennecott-Copper Co. Mr. Forbes has been associated with the Bureau of Mines since 1915. He has been chief of the Health and Safety Division since 1948.

District Sales Managers

PAUL W. SYLVESTER, Allegheny county, Penn., salesman for Zonolite Co., Chicago, Ill., has been promoted to plant and sales manager of the Pittsburgh district, with headquarters in Pittsburgh. He will supervise sales in central Pennsylvania, eastern Ohio and northern West Virginia. Robert Upchurch, formerly eastern Michigan salesman, has been appointed sales manager for Michigan, supervising all sales representatives in the state. Mr. Sylvester has been a Zonolite sales representative since 1949. Mr. Upchurch has been with the company since 1948.

Paul W. Sylvester

Robert Upchurch

A.C.I. Awards

RAYMOND E. DAVIS, Douglas E. Parsons, Walter H. Price, W. G. McCoy, A. G. Caldwell and Otto Safir were presented A.C.I. Awards by President Harry F. Thomson at the February convention of the American Concrete Institute in Cincinnati, Ohio.

Mr. Davis, professor of civil engineering and director of the engineering materials laboratory at the University of California, received the Turner Medal, which is awarded once a year for notable achievements in or service to the concrete industry. He has been active in A.C.I. affairs since 1926. He is a past-president of the institute, and author or co-author of numerous A.C.I. papers. He was awarded the Wason Medal in 1931 and again in 1934, and in 1948 he won the Construction Practice Award. Professor Davis is vice-chairman of A.C.I. Committee 115 on Research, and a member of Committee 207, Properties of Mass Concrete.

Mr. Parsons, chief of the Building Technology Division, National Bureau of Standards, Washington, D. C., was presented the Alfred E. Lindau bronze plaque, which is given only for outstanding contributions to reinforced concrete design practice. An active A.C.I. member since 1926, Mr. Parsons served on the board of direction, advisory committee, and publications committee. He was president of the institute in 1945, and chairman of the Technical Activities Committee in 1948. At present he is serving on A.C.I. Committees 115, 318, 323 and 326 (a joint A.S.C.E.-A.C.I. committee). Author of many papers in the bureau's publications as well as in technical journals, he received the A.C.I. Wason Medal in 1936. Mr. Parsons is also chairman of A.S.T.M Committee C-15 on Masonry Units, A.S.A. Committee A-41 on Masonry, and the Federal Specifications Technical Committee on Precast Reinforced Concrete Products.

Mr. Price, head of the U. S. Bureau of Reclamation's engineering laboratories, Denver, Colo., received the Wason Medal for "the most meritorious paper" of the year. He has been an A.C.I. member since 1937 and is chairman of Committee 210 on Resistance to Erosion in Hydraulic Structures, and Committee 512 on Recommended Practice for Proportioning Concrete Mixes.

Mr. McCoy, director of research, and Mr. Caldwell, research chemical engineer, Lehigh Portland Cement Co., Coplay, Penn., were awarded the Wason Medal for "noteworthy research." Mr. McCoy is a member of A.C.I. Committee 115 on Research, and is also active on A.S.T.M committees on cement, concrete and mortars. He has been a member of A.C.I. since 1946. Mr. Caldwell has been employed by Lehigh Portland Cement Co. since 1934, and devotes considerable time to studies of lightweight aggregates and volume change characteristics of mortar and concrete.

Mr. Safir, consulting engineer, Vancouver, B. C., Canada, whose main interests have been structural development, was presented the Construction Practice Award. After graduation in engineering in 1931, he did postgraduate work in Switzerland on reinforced concrete bridges and, until 1945, worked with consulting engineeers and designing contractors in England. He had his own consulting practice from 1945 to 1949. Since moving to Canada in 1949, he has engaged in similar work there.

Sales Executives

JOHN W. BROWN, general sales manager, National Gypsum Co., Buffalo, N. Y., has been made a top sales executive of the company, reporting directly to the president. Wade W. Hildinger has been appointed assistant general sales manager. David G. Stenberg, general commodity manager, retains his present duties. Dean D. Crandell, vice-president and a director of the company, previously in charge of general sales, will now devote full time to export, industrial and contract sales, including the development of more products and wider markets. Mr. Brown will be in charge of all dealer sales and Mr. Crandell in charge of all other sales activities, relieving John C. Best, vice-president, of all sales duties. Mr. Best will devote his full time to development studies for top management.

Mr. Brown, born and educated in Missouri, attended Central College. He joined the company in 1935 as a general line salesman and later became district manager at Dallas, Texas, and then general sales manager in the executive offices at Buffalo, N. Y.

Mr. Hildinger was born in Oklahoma, received his A.B. degree from Phillip University and did graduate work at Harvard University. He joined the company in 1942 as a general line salesman in Oklahoma. He subsequently became district sales manager and then director of trade relations.

Heads Executive Committee

HAROLD J. BUCK has been elected chairman of the executive committee of The Asphalt Institute, New York, N. Y., and Bernard E. Gray has been re-elected president. Mr. Buck is general sales manager of American Liberty Oil Co., Dallas, Texas. Jewell R. Benson has been appointed special projects engineer at Denver, Colo.

General Manager

K. K. KINSEY, secretary of Concrete Materials and Construction Co., Cedar Rapids, Iowa, has been appointed general manager of the company. He succeeds S. P. Moore, who has been serving as general manager in addition to his duties as president. Gene M. Mason has been named general sales manager; Marvin Nelson, general production manager; William C. Wheeler, chief engineer; and Calvin Moore, division sales manager.

Elected President

C. W. STREIT, JR., executive vice-president and sales manager of Southern Cement Co., Birmingham, Ala., producer of lime-slag cement, has been elected president and general manager of the company. He succeeds George C. Walter, who has retired.

Sales Manager

GAIL HAMILTON has been appointed sales manager of the Ash Grove Lime and Portland Cement Co., Kansas City, Mo. Prior to his appointment two years ago as assistant sales manager, Mr. Hamilton served as territory salesman in northwest Missouri and as contract representative. During his nine years with the company he has become widely known among dealers and contractors throughout the Kansas City area.

Speaks on Cement

A. H. ZIMMERMAN, assistant manager of the Independence, Kan., plant of Universal Atlas Cement Co., New York, N. Y., was guest speaker at a recent meeting of the Independence Junior Chamber of Commerce. He presented an interesting and informative talk on the various processes used in the manufacture of cement.

General Sales Manager

JOHN W. ROCKWOOD has been appointed general sales manager of The Kelley Island Lime and Transport Co., Cleveland, Ohio. He was formerly manager of building sales and succeeds F. J. Collins who was recently elected a vice-president of the company.

OBITUARIES

MORRIS E. LEEDS, founder and chairman of the board of Leeds & Northrup Co., Philadelphia, Penn., died February 8 at Lake Wales, Fla. He was 82 years old and had been ill for several weeks. Reared in a devout Quaker family, Mr. Leeds was educated at Friends Select School, Westtown School and Haverford College. He received a B.S. in biology and botany in 1888. His first job was teaching at Westtown School. Later he joined James W. Queen & Co., then

Morris E. Leeds

the leading American instrument company. Taking a leave of absence for a year, he spent two semesters at the University of Berlin, studying instrument manufacturing. In 1899, he bought a small instrument company and re-named it Morris E. Leeds & Co., and was inventor, designer, factory manager, and salesman. In 1903, he took Edwin F. Northrup, formerly research physicist with Queen & Co., into partnership and the firm became Leeds & Northrup. In 1910 Dr. Northrup sold his interest to Mr. Leeds.

Mr. Leeds had long been interested in industrial relations, and between 1915 and 1920 introduced a stock trust plan and a bonus plan for his company. He also organized the Leeds & Northrup Cooperative Association, to which every employe belongs. He created a trade association, the Scientific Apparatus Makers of America, and was its president from 1920 to 1926, and started the journal now known as the *Review of Scientific Instruments*, of which he was consulting business manager from 1922 to 1937.

Mr. Leeds' business philosophy earned broad recognition, and he received many honors, among them the Henry Laurence Gantt Medal of the Institute of Management for industrial relations achievements; the Edison Medal of the American Institute of Electrical Engineers for the development and production of instruments and controls; the Edward Longstreth Medal of the Franklin Institute for invention of the instrument known later as the Leeds recorder; the Medal of the American Society of Mechanical Engineers; and the annual award of the Scientific Apparatus Makers' Association.

ARTHUR G. JOHNSON, secretary of the Peck-Woolf Sand and Material Co., Kansas City, Mo., died February 7 after a short illness. He was 59 years of age and had been a member of the firm for 30 years.

EDWARD O. SCHNEIDER, sales manager of the Ottawa Silica Co., Ottawa, Ill., died recently. He was 60 years of age. Born in Buffalo, N. Y., Mr. Schneider joined the company as sales manager in 1922. He was formerly sales representative for the McDougall-Butler Co., Buffalo, N. Y. Mr. Schneider was a former member of the Buffalo Yacht Club, the Buffalo Athletic Club and the Ottawa Boat Club. He served during the Texas Border Campaign in 1916, as well as three years with the occupation forces in Germany after World War I.

JOHN FRANCIS NEYLAN, vice-president of Lone Star Cement Corp., New York, N. Y., died February 14 at his home in Flushing, Long Island, after an illness of several months. He was 59 years old. Born in Brooklyn, N. Y., Mr. Neylan joined Lone Star in 1922, starting as assistant to the traffic manager. He subsequently became assistant sales manager in the Albany office, and in 1931 was appointed assistant general sales manager in New York, serving in that capacity until 1939, when he was made general sales manager. He had been vice-president in charge of sales since 1945. Mr. Neylan was widely known throughout the cement industry and was active in the affairs of the Portland Cement Association.

John Francis Neylan

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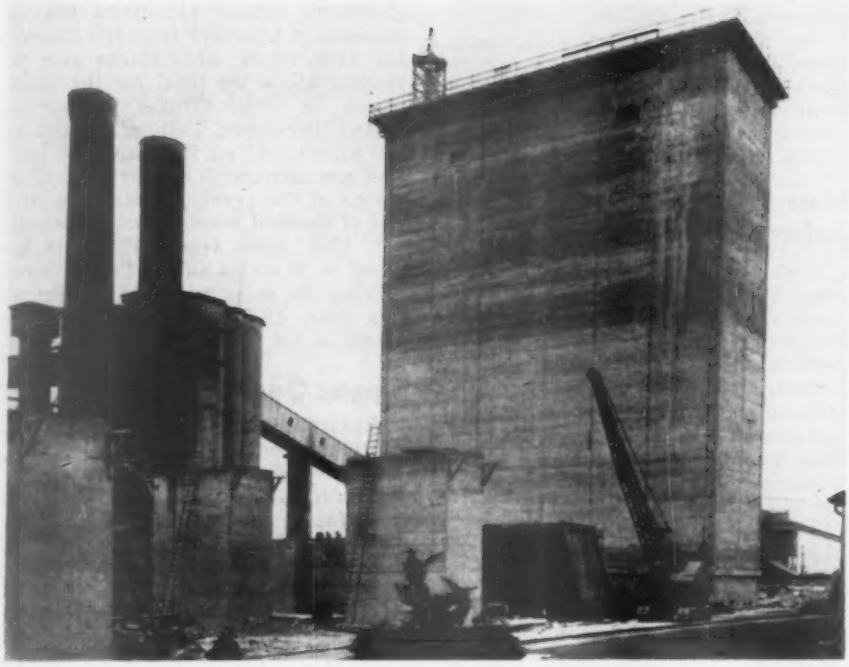
industry news



World's tallest stone-storage silo; the concrete piers in the foreground will support two rotary kilns

Basic Refractories Expansion

BASIC REFRACTORIES, INC., Cleveland, Ohio, recently completed a new stone-storage silo at its Maple Grove, Ohio, plant, which is said to be the world's tallest stone-storage silo. The new silo is a part of a $3,500,000 expansion program at the Maple Grove plant.

Standing 122 ft. high, the silo houses 12 bins and will store approximately 10,250 tons of No. 6 stone (⅜ in.) in eight of the bins and a substantial tonnage of supplemental raw material in the other four.

Basic Refractories' No. 8 stone (passes a 0.075 screen and meets state specifications for concrete sand) is being used in the concrete for the new expansion.

The MacDonald Engineering Co., using the slip-form technique of placing concrete, completed the silo structure in a record eight days, despite adverse weather conditions.

The new silo will be fed by a cross belt from the adjacent silo, which in turn is fed by a 735-ft. conveyor from the stone mill at the quarry site.

The expansion program, which is expected to be completed by mid-year, also includes the construction of two 215-ft. steel exhaust stacks, the installation of two new rotary kilns, and the construction of the finished product and coal-handling sections. The

Kiln sections, 60-75 ft. in length, 11¼ ft. in diameter and ⅞ in. thick, will be welded to form two 390-ft. rotary kilns

new kilns when assembled will measure 390 ft. in length and will be the world's largest in the refractory industry.

The Maple Grove plant presently produces about 600,000 tons of dead-burned dolomite annually; the expansion will add a minimum of 300,000 tons. Basic Refractories also operates a $3,000,000 plant at Gabbs, Nev., for the production of dead-burned magnesite.

Diamond Anniversary

FOOTE MINERAL CO., Philadelphia, Penn., recently observed its 75th anniversary, and the first anniversary of its Kings Mountain Division which was acquired last year from Solvay Corp.

A new mill and mine facilities have been completed at the Kings Mountain Division where some 360 tons of pegmatite are processed daily. Pegmatite is taken from the quarry and transported to the mill where it is crushed to pass a 20-mesh screen. The flotation process of separation is used.

Foote Mineral Co. also recovers feldspar, mica, spodumene, tin and columbite in commercial quantities.

Canadian Cement Plant

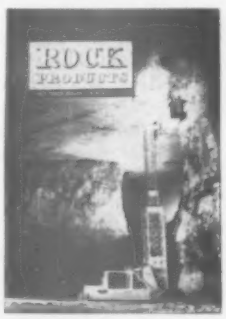
SWISS INTERESTS PLANNING to build a $5,000,000 cement plant near Quebec City, Can., recently received acceptance of their project from the Legislative Assembly private bills committee. The arrangement now is that construction must begin within 15 months following approval of an acceptable arrangement for taxes.

Buys Stone Quarry

ELMER ALBERTS, Sturgeon Bay, Wis., recently became the owner of the Sturgeon Bay Stone Co. quarry where he had formerly been an employe for 23 years. The property consists of 270 acres of land with an acre and a half of shore frontage which will be used for building sites. The plant had been abandoned in recent years, but a considerable quantity of stone still remains.

Cover Picture

EXTENSIVE TESTS and experimental work have been carried on at Rifle, Colo., by the United States Bureau of Mines for the purpose of developing a low cost underground mining method for handling large tonnages of oil shale. With the increased use of petroleum products, these oil shale deposits are receiving more attention from oil producers.



The equipment and procedures for mine-structure stress analysis developed at the operation should find wide application throughout the rock products industries in predicting safe mine-structure design. In addition, some of the drilling, blasting and handling equipment may also find use in the nonmetallic mining fields.

Shown on the cover is a 65-ft. telescopic scaling rig. The platform has controls on it for raising or lowering and the mast can be tilted forward 10 deg. and backward 5 deg. Further details of the equipment and operation can be found on page 80.

Zoning Problem Studied

A DEBATE over the operation of sand and gravel properties in Milwaukee county, Wis., residential areas has been placed before the county park commission. A proposed ordinance, prepared by the county planning engineer, would permit operations in residential areas, providing certain regulations were observed—such as filling in excavations as fast as possible. However, an attorney for Greenfield, Wis., who was backed by attorneys for Granville and Wauwatosa, wanted to prohibit all such operations in residential areas unless authorized by a zoning change.

An attorney for A. G. Reiske Sons Co., sand and gravel firm, held that the latter proposal would legislate the business right out of the county because few nonresidential areas were left, and that would mean heavier expenses for builders because of the extra hauling of materials. The commission is holding the problem over for further study.

Lightweight Aggregates Plant

SUNNYHILL AGGREGATES CO., New Lexington, Ohio, is building a $500,000 plant near New Lexington, for the production of Lite-Stone, an expanded shale lightweight aggregate. The first unit, which will be completed and in operation in April, will have a 100,000-cu. yd. annual capacity. Before building the plant, the company spent two years in intensive research to determine the suitability of the shale deposit for the manufacture of a high-quality product.

Lite-Stone will be shipped by rail and truck to all parts of Ohio and to Michigan, Pennsylvania, West Virginia, Kentucky and Indiana. Large quantities of lightweight aggregate are being produced in the South and West, but until now only limited quantities have been available in the Northeast.

River Transportation

U. S. ARMY ENGINEERS have been asked by three firms to continue operation of 11 federal locks on the Muskingum river. The firms are Muskingum Gravel Co., Marietta Concrete Corp. and Dravo Corp.

The engineers sought last year to abandon operation of the locks from Marietta, Ohio, to above Zanesville, contending there was insufficient navigation on the Muskingum river to justify federal costs required to operate and maintain the project.

The companies requesting the continued operation of the locks stated they could move materials much cheaper by barge than by other methods. An official of the Muskingum River Gravel Co. estimated that it would cost an extra $300,000 a year to move its sand and gravel by truck, and that this additional charge would be passed on to the public. He also disclosed that his firm is negotiating for transportation of about 500,000 tons of coal on the Muskingum this year. He cited large coal acreage north of Zanesville which, he said, will be moved within ten years, via the river, if the stream is navigable.

The Senate Appropriations Committee has ordered the engineers to operate the locks for the rest of this fiscal year (till June 30) to give local interests a chance to develop traffic on the river.

New Publication on Asbestos

NATIONAL BUREAU OF STANDARDS, Department of Commerce, has announced publication of "Physical Properties of Some Samples of Asbestos-Cement Siding," by Cyrus C. Fishburn. This is N.B.S. Building Materials and Structures Report 122, and contains 15 tables, two half-tone illustrations; it is available from the Government Printing Office, Washington 25, D. C., price 15 cents.

The report gives in some detail the physical properties of samples of American asbestos-cement siding and also briefly discusses similar data contained in a recent British report on the effects of natural and artificial weathering of asbestos-cement roofing. The N.B.S. investigation covered measurements of water absorption, weight, porosity, dimensional stability, flexural strength and flexibility of 23 samples of American asbestos-cement siding furnished by eight manufacturers. Results are compared, wherever possible, with those included in the British study on asbestos-cement roofing materials. Measurements of samples were made to develop methods of testing suitable for use in specifications.

Changes Firm Name

ANNOUNCEMENT has been made of the establishment of Dillon Stone Co., Columbus Junction, Iowa, as successor to Dillon, Sharp and Co. The new firm, of which William D. Dillon is president, is under the same executive management.

Portland Cement Production

THE PORTLAND CEMENT INDUSTRY produced 19,874,000 bbl. of finished cement in December, 1951, as reported to the Bureau of Mines. This was an increase of 4 percent compared with the output in December, 1950. Mill shipments totaled 11,790,000 bbl., a decrease of 6 percent from the December, 1950, figure, while stocks were 38 percent above the total for the same month in 1950. Clinker production during December, 1951, amounted to 20,780,000 bbl., an increase of 3 percent compared with the corresponding month of the previous year. The output of finished cement during December, 1951, came from 153 plants located in 36 states and in Puerto Rico. During the same month of the previous year, 19,116,000 bbl. were produced in 150 plants.

Opens Quarry

BRAMHALL CO., Carrollton, Mo., recently opened a quarry near Berlin, Mo. The first project of the new operation is to supply crushed stone for the resurfacing of the state highway between Berlin and Maysville and for the Berlin-King City highway.

Gravel Made from Sand, Clay or Mud

CORNELL UNIVERSITY has announced the discovery of a process to change mud, sand or clay into good "gravel." The process was developed by Prof. Benjamin K. Hough of the School of Civil Engineering and Prof. Julian C. Smith of the School of Chemical and Metallurgical Engineering. The research is sponsored by the U. S. Army Corps of Engineers.

The new "gravel" process is said to be sufficiently economical to be useful for road building where gravel is scarce, and consists of some type of earth (mud, sand or clay), plus sulfite liquor and some chromium and sodium or potassium. The mixture is fused in a briquetting machine into pieces resembling oversize dog biscuits and is then crushed to sizes suitable for road building. Preliminary freezing and thawing tests have indicated the aggregate to be sound.

Coming Conventions

May 8-10, 1952—
National Lime Association, 50th Annual Convention, The Homestead, Hot Springs, Va.

May 15-17, 1952—
National Industrial Sand Association, 17th Annual Meeting, The Homestead, Hot Springs, Va.

June 3-4, 1952—
National Agricultural Limestone Institute, Hotel Sheraton, Chicago, Ill.

June 23-27, 1952—
American Society for Testing Materials, 50th Anniversary Meeting, Hotels Statler and New Yorker, New York, N. Y.

Sand and Gravel Exempted from Renegotiation

THE RENEGOTIATION BOARD, on January 10, 1952, issued tentative regulations, under the Renegotiation Act of 1951, exempting the sand and gravel industry (including industrial sand) from the obligation to renegotiate under that statute, as was recently announced by the National Sand and Gravel Association in a memorandum prepared by its tax council, John T. Sapienza. According to the memorandum, "neither profits from contracts with government agencies for the sale of sand and gravel, nor profits from subcontracts under such contracts, will be subject to renegotiation."

This action of the Renegotiation Board continues the policy of excluding the industry from renegotiation as was established during World War II. The Renegotiation Act of 1951 provided, among other things, for an exemption from renegotiation for any contract or subcontract for a product of a "natural deposit" which has not been processed "beyond the first form or state suitable for industrial use." In the tentative regulations just issued are provisions specifically exempting "aggregates, including such items as washed or screened sand, gravel or crushed stone." It is believed that these provisions of the tentative regulations will be promulgated in the final act. Industrial sand was not specifically listed as an exemption, but the tentative regulations are not intended to be all-inclusive and, under the act itself, a producer of industrial sand can take the position his products are exempt because they are not processed beyond the first form or state suitable for industrial use. It is believed that industrial sand will be specifically exempted in later issues of the regulations.

If a producer processes a product from a natural deposit beyond the first form or state suitable for industrial use, profits from the sale of such products are then subject to renegotiation. However, the producer may charge off the value of the product in its first form or state suitable for industrial use if that value is more than the cost to him of processing the product to such form or state.

Vermiculite Plant

ZONOLITE CO., Chicago, Ill., has announced that a new vermiculite processing plant to be operated by California Zonolite Co., has been opened in Glendale, Ariz. The new plant will process vermiculite ore from the Zonolite mine at Libby, Mont., to serve contractors, dealers and architects throughout Arizona, according to C. L. Woodworth, in charge of production and sales at the new plant.

This brings to 36 the number of Zonolite processing plants in the United States and Canada.

Shown above at the plant of Cleveland Builders Supply Co., Cleveland, Ohio, is a 28-year-old, 40-ton, McMyler Interstate crane, converted from steam to diesel power with a 200-hp., Model NHIP-600 Cummins diesel torque converter unit. Fuel costs reportedly were cut from $15 to 98.68 cents per 8-hr. day by the conversion

Promoting State-Made Cement

SOUTH DAKOTA STATE CEMENT PLANT, Rapid City, S. D., has inaugurated a state-wide sales campaign through the use of colored slides, with sound accompaniment, which explains operations of the state-owned cement plant. The slides will also be shown in surrounding states. Recent expansion, which doubled plant capacity, has enabled the company to expand its sales territory.

Phosphate Fertilizer Supply

THE AGRICULTURAL DEPARTMENT predicted a drop in phosphates available for fertilizer in 1952, but expects slight increases in potash and nitrogen. The department advised the Fertilizer Industry Advisory Committee that prospective supplies of basic fertilizers for 1952 would be, approximately: nitrogen, 1,375,000 tons, an increase of 7 percent from 1951; potash, 1,515,000 tons, an increase of 5 percent; and phosphates, 2,100,000 tons, a decrease of 6 percent. Shortage of sulfuric acid is responsible for the decrease in phosphates for agriculture.

Reopens Lime Plant

BLUEGRASS LIME CO., Maxwell, W. Va., has completed the rebuilding of its lime plant and has reopened for business, after having been out of production since the destruction of the plant by fire in October, 1949. The plant is new throughout, the three original kilns having been replaced with two of modern construction, and other equipment replaced with new machines, operated as individual units. Machinery was driven by lineshaft in the old plant. The plant has a daily capacity of 20 tons of burned lime for mason's hydrate and agricultural use.

The company was founded in 1914 by Fields Graybeal, who was killed in a quarry blast in 1941, along with his son, Monroe, and a laborer. Mrs. Monroe Graybeal then operated the plant until 1943 when it was purchased by A. S. Graybeal and has since been operated by his son, Hopkins Graybeal.

Lightweight Aggregate

OHIO RIVER SAND CO., Louisville, Ky., is negotiating with the county forest commission and other county officials for obtaining a 50-year lease on 168 acres of the county forests for shale quarrying operations.

The county had advertised for bids on the shale-operation lease, but Ohio River Sand Co. made the only offer. A condition of the lease is that trees along the highways be left standing. At the close of the mining operations, the county plans to reforest the land.

Upon completion of negotiations, the company plans to expend about $500,000 for establishing a lightweight aggregate plant, according to C. P. Hegan, vice-president and general manager.

Pavement Yardage

AWARDS OF CONCRETE PAVEMENT for the month of January, 1952, are listed by the Portland Cement Association as follows:

	Sq. yd. awarded during January, 1952
Roads	1,496,636
Streets and alleys	1,369,455
Airports	621,356
Total	3,487,447

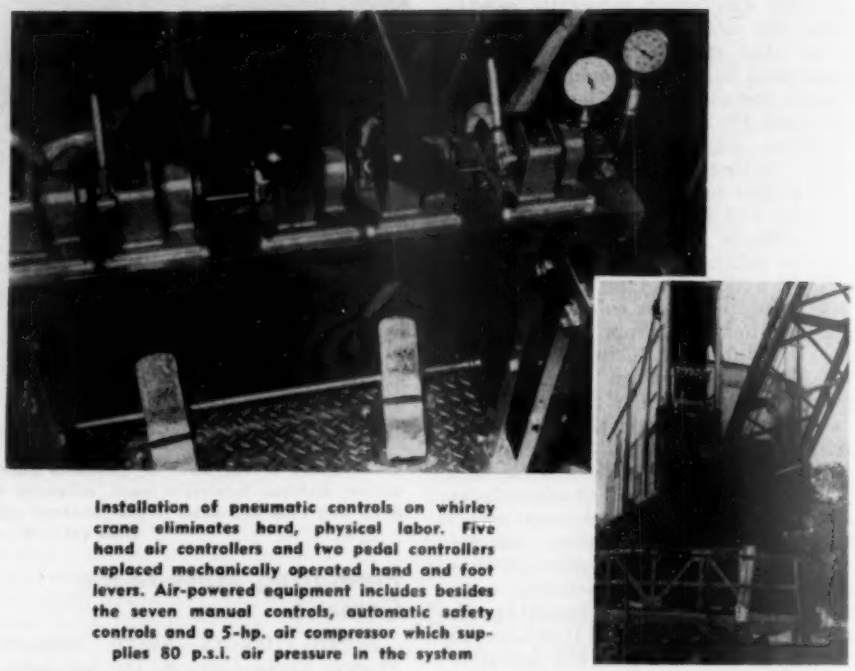
HH

Pneumatic Control System

TO ELIMINATE HARD, physical labor formerly required in operation of a 20-year old whirley crane, an Eastern sand and gravel operation installed a pneumatic control system. Air-powered actuators instead of a mechanical lever system now apply clutches and brakes on the boom, holding line, closing line and cab brake.

The new controls were specified when the regular operator, a big man of exceptional strength, became ill and substitute operators of less weight and strength were unable to handle the crane satisfactorily. The crane can now be handled by a seated operator and maximum force on all pneumatic controls is 10 lb.

A 5-hp. compressor delivers 80 p.s.i. air pressure to the actuators. On the operating levers a back pressure of 8 p.s.i. is used in lieu of springs for returning levers and pedals. On the foot-operated holding and closing line brakes, a preload of 5 p.s.i. is applied to give instant action and to minimize friction in the rigging or cylinders. A safety feature of the new control system is the automatic application of brakes when and if the air supply pressure drops below 50 p.s.i., which could occur in the event of a broken line in the main control system, compressor failure, excessive use of air, or other accidental cause.



Installation of pneumatic controls on whirley crane eliminates hard, physical labor. Five hand air controllers and two pedal controllers replaced mechanically operated hand and foot levers. Air-powered equipment includes besides the seven manual controls, automatic safety controls and a 5-hp. air compressor which supplies 80 p.s.i. air pressure in the system

The crane shown is an electrically-driven, C-14 Dravo whirley mounted 30 ft. above the ground. Equipped with a 70-ft. boom, it is rated at 15 tons at 35 ft. The pneumatic controls were supplied by Westinghouse Air Brake Co.

Removing Clay from Gravel

By Donald S. Phelps

AMONG THE MANY PROBLEMS arising in the treatment of sand and gravel is the one in which there is an objectionable amount of clay in the aggregate. Some time ago, there appeared in this section of ROCK PRODUCTS a short description of one operator's solution to this problem. This method consisted of a water wash in a pool, removal from the pool and loading on cars where a determination was made as to the acceptability of the product. If found unacceptable, the car was unloaded in a yard and the gravel was pushed around by a bulldozer until a sufficient amount of the clay had been worn off to make the product acceptable. Many feel that while this method may be acceptable in some cases, it appears inadequate where specific standards are required. In other words, how could the operator know when he had pushed the gravel around enough?

A similar problem has been met by many ore-processing plants in various ways. There are a number of combinations of machinery and reagents that can be used. The method here described can be adapted to the sand and gravel industry.

The sand or gravel is fed to a pool or a classifier where water is added and, at the same time, a dispersing agent. The gravel is kept in motion to release the clay and allow it to be discharged over the weir with the water. The coarse material is delivered by the classifier rakes as a deslimed product. The sand or gravel must be fed to the circuit at a fairly constant rate and the addition of water must be made before the material gets to the classifier.

A classifier is considered better than a pool because it is easier to keep the material in motion. For gravel, a drag classifier is recommended because it can handle coarse gravel better; for sand, any standard type of mechanical classifier can be used.

The reagent should be added as early in the circuit as possible, preferably with the first addition of water, unless this water is discarded before reaching the classifier; however, it can be added directly to the classifier and still do a good job.

The reagent may be any one of a number of dispersants or deflocculators. Not all of them will work in any particular case. Sodium silicate is probably the best known dispersant. The choice depends upon the effectiveness of the particular reagent or combination of reagents and the allowable cost. The amount of reagent varies from about 1/10 lb. up to 5 lb. The cost of treatment is governed by the amount of clay contained, the condition of the water, whether strongly acid or not, and the degree of dispersion required to obtain the desired product. The cost is held down somewhat by the value of the product; if the value is low, there is a tendency to go to cheaper reagents, despite the fact that sometimes these do not do as good a job as might be done. One company has as much as 25 percent of minus 325-mesh material which is removed, and yet the cost is less than four cents per ton of feed.

The capacity of the plant can often be increased by this separation of the slimes. In one plant where this method of control was adopted, the capacity of the plant was increased 75 percent, based on the original feed. The actual cost was about one cent per ton.

The kind of reagent that will work best in any particular case can be determined by simple and inexpensive tests. To interpret the tests, however, does require a good deal of experience. The procedure can be taught to the men on the job in any particular instance so that controls can be set up without difficulty.

Determining Cost of Excess Air

By W. F. Schaphorst

MUCH HAS BEEN said in printed matter and in lectures on combustion concerning the expensiveness of excess air, but little has been done in the way of tables, formulas, or charts in showing what this waste amounts to in the terms of actual dollars and cents. The accompanying chart can be used in figuring the cost of excess air.

For example, if we have a given fuel of 10,000 B.t.u. per lb., start at the 10,000 in column A. Now, if the excess air passing up the stack per hour is 1000 lb., column B, run a straight line through that 1000 and locate the intersection in column C. Then from that intersection run through the difference between the stack gas temperature and the temperature of the air on entering the furnace which, in this problem, we are assuming to be 500 deg. F., column D. This locates a point in column E. From that point of intersection, run through the "cost of fuel per ton," column F, and the intersection with column G then gives the cost of excess air per year. The writer has chosen $8 per ton in column F and as a result, we get $420 as the cost of excess air per year.

To determine the excess air per hour, in column B, may require the use of a measuring device of some kind. Often as much as 100 percent excess air is used and sometimes even more. It is costly and worth guarding against. To determine the minimum weight of air required for combustion, it is necessary to know approximately, at least, the parts by weight of carbon, hydrogen and oxygen in 1 lb. of fuel. These percentages are given in government reports and can also usually be obtained from the mine owners or from dealers.

To compute the number of pounds of air required per pound of fuel, divide the weight of oxygen per pound of fuel by 8 and subtract it from the weight of the hydrogen in 1 lb. of fuel. Multiply the difference by 3. Add the product to the weight of carbon in each pound of fuel. Then multiply by 11.6. The result is the number of lb. of air per lb. of fuel, usually called the "theoretical amount of air."

Knowing the minimum by computation, and the amount of air actually used by measurement, simply subtract and you have the value for use in column B. Of course, in this connection, we must know the number of lb. of fuel burned per hour to compute the total theoretical amount of air.

Should the reader wish to compute the cost of excess air per year mathematically, rather than by use of this chart, it can be done by proceeding as follows: Subtract the temperature of the air passing into the furnace from the stack gas temperature and multiply by 1.05; multiply that amount by the pounds of excess air used per hour; multiply that by the cost of the fuel per ton; then divide by the B.t.u. per pound of fuel. The result is the cost of excess air per year, assuming that combustion is continuous.

Study and application of this chart should soon convince anyone that it is important to reduce the consumption of air down to the lowest possible amount—as near the theoretical as possible. Thus, column G shows that within the range of this chart the cost of excess air may be all the way from $10 to $6000 per year. At little cost, a good damper regulator can be purchased and installed on every boiler. Air meters do not cost much compared with the annual waste that so commonly takes place. Wherever fuel is consumed and where fuel is expensive, this matter of excessive air is generally worth careful attention.

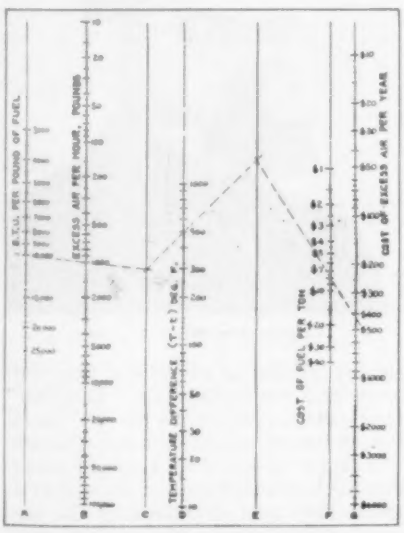
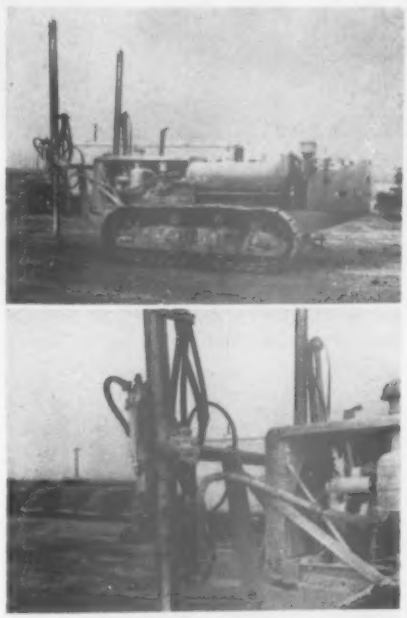


Chart for determining the cost of excess air

Drill Jumbos for Surface Work

DRILL JUMBOS have been in use in underground mining work for many years. "Jumbo" is the name given to a portable, or semi-portable, drill carriage on which can be mounted one or more percussion drills. In some of the large tunnels in the West, as many as nine heavy drifters were mounted on one assembly and the jumbo was moved in and out of the tunnel as blasting required it. By the use of jumbos, one miner can look after two or more drills, thus adding to the efficiency of an operation.

The adoption of a jumbo for surface work, however, has been slow to develop, especially in the rock products industries. One of the first observed was on a highway construction job where two wagon drills were mounted on the front end of a tractor, with an air compressor mounted on the frame.



Top: Two wagon drills and air compressor mounted on tractor increase efficiency of surface-drilling operations. Bottom: Shows how drills were mounted to tractor

A similar rig was observed at a small limestone quarry in the Mid-South. The drills were putting down 23-ft. holes. The illustrations show how these drills were mounted to the tractor.

The U. S. Bureau of Mines at Rifle, Colo., has designed and placed in operation a somewhat similar jumbo. It is mounted on crawler treads and has a 3½-in. extra heavy, steel pipe mounted on the two sides of the tractor as well as in front, thus giving the jumbo greater versatility.

Cement Temperature Gauge

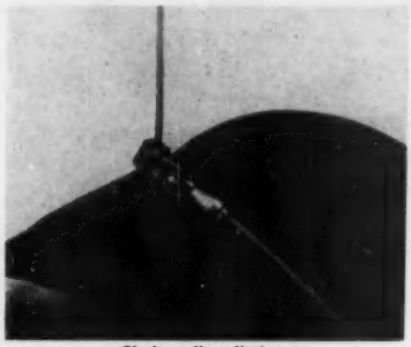
AT A LARGE DAM under construction in the West, portland cement is delivered to the construction site by bulk-haulage trucks. At the silos a truck hopper has been provided in which there are parallel water pipes through which cold water flows. Additional cooling can be had by using cement coolers which are essentially heavy screw conveyors with hollow flights through which cold or ice water can be passed. Still more cooling can be obtained in the air-activated gravity conveyors used to deliver the portland cement to the batchers.

At one point in the delivery system used for the portland cement, provision has been made for inserting an indicating thermometer so the operators can gauge the temperature of the cement. It is a small, shockproof, Weston thermometer which has a small dial gauge. The stem of the thermometer is about 8 in. long and ¼ in. in diameter and is inserted into the stream of portland cement through a hole drilled in the pipe line. The hole is of such diameter as to provide a snug fit.

NEW Machinery

Sling Fitting

ELECTROLINE Co., 4121 S. LaSalle St., Chicago 9, Ill., is manufacturing a choker sling fitting, employing two overlapping and co-acting hooks which are applied to a wire rope to form a loop of any desired size. The hooks are



Choker sling fitting

joined to the fitting portion of the choker sling fitting by a pivot which allows the unit to conform automatically to the size of the load. This unit, besides having a rope socket, can be furnished with a simple locking device which prevents the rope from slipping through the hooks.

Control Circuit Cable

BAILEY METER Co., 1050 Ivanhoe Rd., Cleveland 10, Ohio, has announced that pneumatic and hydraulic control circuits may now use Armortube cable, a flexible, protected multitube transmission line. This cable is made up of ¼-in. O.D. aluminum or copper tubing gathered in a slow continuous spiral similar to the construction of rope. A tube bundle is first wrapped in water-repellent insulating tape; then encased in heavy rust-resistant, galvanized steel strip. Available in bundles of 4, 8 and 12 tubes, this cable is said to be capable of transmitting hydraulic control pressures as high as 3000 p.s.i.g. and all ranges of pneumatic control pressures.

Cable tube bundles

Dump truck for stripping and quarry operation

Dump Truck

THE WHITE MOTOR Co., Sterling Div., Cleveland 1, Ohio, has announced its Sterling-White 18-ton dump truck for stripping and quarry operation. Featured in the new dumper is a planetary-drive type rear axle equipped with the company's Super-Traction differential, which divides the power delivered to each rear wheel according to the grip dictated by road and load conditions. This unit has a short 161-in. wheelbase and a hydraulic power-actuated steering gear. There is a range of ten forward speeds in the heavy-duty transmission, and tires are 13.00-24 front and 14.00-24 dual rear with both front and rear tires having a lug type tread especially designed for operating on rough, unimproved surfaces.

Automatic Transmission Truck

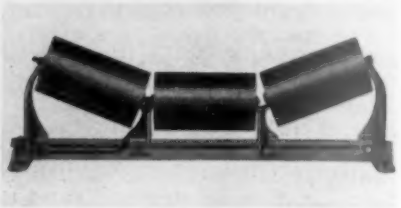
GMC TRUCK & COACH DIV., General Motors Corp., 660 South Blvd., East, Pontiac 11, Mich., has announced that its new truck has a fully automatic transmission, said to be the first commercial model truck so equipped. The company's Dual-Range Hydramatic drive, designated as the P152-22, provides three speeds for city driving and four for suburban or country driving. The truck division last year placed the Hydramatic drive in its M-135 military truck, which has been in production since last September.

Control Valve Assembly

MINE SAFETY APPLIANCES Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Penn., has developed a compact valve assembly for use with the company's air line respirator, abrasive masks and abrasive helmets. This continuous air flow control valve regulates air flow from a compressed air source to an operator using respiratory protective air line equipment. It also acts as a secondary air filter. Three parts—a cartridge container, a cartridge and the air flow check valve—comprise the entire assembly of the control valve.

Idler Accessory

CHAIN BELT Co., 1600 W. Bruce St., Milwaukee 4, Wis., has announced a basic improvement in belt conveyor

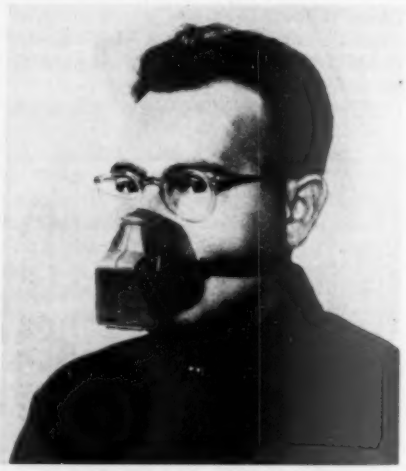


Idlers with flexible grease tubing

idler greasing design. Rigid steel grease piping has been replaced by reinforced flexible automotive type grease tubing, which, it is claimed, will take higher gun pressures and will not be broken off in shipment. The flexible sections are made in lengths which allow them to hug the inside of the inverted angle or channel base. Grease tube extension to the far sides is accomplished by threading a flexible section through the base to the grease fitting at the near side.

Dust Respirator

MINE SAFETY APPLIANCES Co., Braddock, Thomas and Meade Sts., Pittsburgh 8, Penn., has announced its new dust respirator, called Dustfoe No. 55, which weighs 2¾ oz., 25 percent less than previous models. It is said that the formable aluminum facepiece is



Respirator weighing 2¾ oz.

readily molded to all normal face contours and the replaceable "Tite-Seal" face cushion conforms to all facial lines without uncomfortable pressure. The filter is made of charged resin-treated felt which creates a static electrical field and supplements the mechanical filtering action by trapping dust particles.

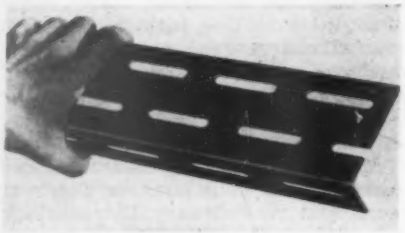
Extends Tractor-Shovel Line

THE FRANK G. HOUGH CO., 705 Seventh St., Libertyville, Ill., has made available another four-wheel drive Payloader tractor-shovel. It has a 1-cu. yd. bucket, with 60-hp. diesel or 54-hp. gasoline engine optional. The use of large pneumatic tires, the same size all around, and drive on all four wheels are said to give this machine traction and flotation to work effectively in sand, mud and snow and travel on pavements without injuring the surface. Bulldozer blade, crane hook, fork lift and snow plow attachments are available, and are interchangeable with the bucket.

Tractor-shovel with 1-cu. yd. bucket

Steel Angle

ACME STEEL CO., 2840 Archer Ave., Chicago 8, Ill., has announced a 10 ft. long, 3- x 1½- x 0.080-in. slotted-leg, galvanized steel angle, said to be designed for all-purpose industrial fabrication. This unit, known as the DexAngle, has lengthwise rows of slots which are said to permit rapid assembly by bolting of shelving, bins, scaffolding, etc. Auxiliary components



Slotted-leg, galvanized steel angle

such as panels and casters give the assembled equipment a wider versatility, and when used as uprights in lengths up to 5½ ft., these angles will individually support loads as high as 1200 lb. These DexAngles are sold by the package, each containing ten 10-ft. lengths of angle and 75 bolts and nuts. Shelving panels are available in packages of 12, with 24 bolts and nuts, and caster assemblies are packed four to a package.

Drilling Tools

ROCK BIT SALES & SERVICE CO., 2514 E. Cumberland St., Philadelphia 25, Penn., has offered a complete set of tools for use with the standard percussion type rock drills, for drilling long holes varying in depth from 20 to 150 ft. They are for use in drilling grout holes, test holes, sublevel bench stoping holes or blast holes of standard diameters—1⅞ and 3 in. The manufacturer claims that such holes can be drilled in any type of rock or ore and in any direction. In addition, it is said that the couplings and adapters are designed to be self-cooling and self-cleaning.

Hollow Pin Chain

ACMOR CONVEYOR CHAIN CO., 17700 Broadway, Bedford, Ohio, has announced as available its Type HP (hollow pin) chain in either a steel roller or bushing type in 2-, 2½-, 3- and 4-in. pitch. Stock attachments are available for all pitches which are either bolted or welded to the chain proper. Type HP chain is available on special order in various strengths and pitch up to 12-in. pitch.

Industrial Dust Pan

PALMER-SHILE CO., 12660 Mansfield, Detroit 27, Mich., has introduced a lightweight dust pan, said to be constructed to withstand rough usage in industrial plants. The metal pan measures 18 x 18 x 18 in. and is made of 16-gauge sheet steel. The frame is of 1- x 1½- x ⅛-in. angle iron with a handle of 1-in. tubing, and is of all welded construction. Over-all height is 48 in.

Sectional Belt Conveyors

TRANSALL INC., 109 N. 11th St., Birmingham 4, Ala., has developed an improved line of sectional belt conveyors of the type commonly used for main haulage and entries in underground mines. Sections are chair supported for mounting on floors, ramps or cross ties and low cost anchored foundations are available for long distance overland installations. Sections are hinged at the mounting point to allow the conveyor to conform to rolling or uneven terrain, and all parts are interchangeable. All sections are equipped with Transall heavy duty prelubricated idlers.

Hardfacing Chart

AMERICAN MANGANESE STEEL DIV., American Brake Shoe Co., Chicago Heights, Ill., has designed a wall chart which details the proper hardfacing rod for the job. The chart divides welding into basic operations, under which are listed the equipment parts to be Amscoated together with the recommended rod, available sizes, and preferred method of application. The chart is 17 x 26 in. with tabs attached for easy hanging.

Laboratory Dryer

DENVER EQUIPMENT CO., 1400 17th St., Denver, Colo., has developed a compact laboratory dryer, which operates on single-phase, 50-60 cycle, 110 or 220 volts a-c. It has an asbestos air-cell insulated oven using a pair of standard, replaceable heating elements. Exact temperature is maintained with a thermostat control that enables adjustments between 0 and 325 deg. F.

Compact laboratory dryer

Flexible Hose

AMERICAN VENTILATING HOSE CO., 100 Park Ave., New York 17, N. Y., has announced the development of a lightweight, flexible hose made with neoprene compounds and laminated nylon chafer duck. For pressure and vacuum services, this wire-reinforced Flexaust hose has been designed for operations involving abrasive dust collection, heavy flexing and gravity feeds. Size range is 1½- to 24-in. inside diameters.

Sand and Gravel Producers Hold Record-Breaking Annual Meeting

Program embraced percentage depletion, safety, highway problems, price control, construction outlook, priorities, wage and salary regulations, labor relations, plant operations, zoning, quality concrete and bituminous mixtures

A NEW ALL-TIME RECORD of more than 3200 registrants was established for the 36th annual meeting of the National Sand and Gravel Association and the 22nd annual meeting of the National Ready Mixed Concrete Association held at the Conrad Hilton Hotel, Chicago, Ill., February 11-15.

According to established practice, that a machinery exposition be held every even year, this was an exhibit year and the largest and finest display of machinery and equipment ever presented to these industries was a featured attraction. It was a successful display from the viewpoint of manufacturers of equipment even though the world's largest hotel proved it can no longer house the exposition. Exhibits were on display not only in the main exhibit hall but in the exhibit lobby, on the mezzanine floor and in parking lots adjacent to the hotel. All classes of equipment for production and transportation, including many entirely new developments were on display.

With the increasing interest on the part of both producers and manufacturers in expositions, an important decision had to be made at this meeting. The question was debated as to whether the two associations should exercise their option for the Conrad Hilton Hotel in 1954 or plan to hold the 1954 exposition in an outside auditorium like in Cleveland, Ohio. The Manufacturers Division held a preconvention meeting to consider the question and opinion was almost equally divided either way. The subject was then considered by the boards of directors of N.S.G.A. and N.R.M.C.A. and, after considering all angles, it was unanimously decided that the 1954 meetings and exposition will be held again at the Conrad Hilton Hotel in Chicago the week of February 14, thus continuing the consecutive week arrangement with the National Crushed Stone Association.

The 1953 conventions of the two associations will be held, without exposition, at the Hotel Fairmont, San Francisco, Calif., February 22-26. While it will be necessary to occupy a number of hotels outside the official hotel, it was guaranteed that first-class accommodations will be made available and manufacturers and their wives were cordially invited to attend the industry meetings.

The 1952 semi-annual meeting of the boards of directors will be held at the New Ocean House, Swampscott, Mass., September 29, 30 and October 1, at which the time and place of the semi-annual board meetings for 1953 will be determined.

The excellent attendance at this year's meetings reflected the continued prosperity of both industries and, as was apparent from open forum discussions, the desire to learn more about how to live with government regulations. A good part of the attendance consisted of operating men who filled the exposition halls.

Past president Thomas E. Popplewell, chairman of nominating committee, left, poses with (l. to r.) retiring president H. N. Snyder and new N.S.G.A. officers: president Albert R. Shiely, vice-president John W. Murphy and secretary-treasurer R. E. Weaver

Program

Meetings of the two boards of directors and a joint luncheon for both were held on February 11 preceding opening of the convention sessions the following day.

Both boards of directors approved increased budgets, including an increase in the fund payable to the University of Maryland, as an expression of the associations' appreciation of the splendid cooperation they have enjoyed with the university in the conduct of research. Among engineering and research subjects covered in both meetings were the contract with the University of Maryland, fire tests, mixer tests, revision of the "Your Job" booklet, appointment of research fellows, prejudicial specifications, training courses, the annual short course and regional meetings.

Director of engineering Stanton Walker told of some recent tendencies to change building codes which might hurt the cause of concrete unless preventive steps be taken. Research plans provide for an increased study of bituminous mixtures with emphasis on adhesion, stability and designs to minimize the effects of angularity. Freezing tests, in both air and water, are being pushed in efforts to correlate laboratory findings with occurrences in nature.The results of a two-year study of thermal compatibility have been drawn up.

An increased stipend for the associations' fellowships at the Univer-

sity of Maryland has been provided and it is hoped that each association may soon have a fellow to conduct research. Both Mr. Walker and Mr. Ahearn have been active in regional meetings which were reported. Both associations approved well-worded resolutions presenting a strong case for removal of the price controls that plague the industries, which members will have available for their use in contacting their Congressmen for action.

The general sessions covered three and one-half days and there were five joint meetings. In addition, there were separate sessions covering subjects peculiar to each industry which necessitated holding several simultaneous sessions.

Among special scheduled meetings were the meeting on Sunday, February 10, for associate members to consider future exhibit plans, the two boards of directors meetings, a luncheon meeting for members of the Ohio Ready Mixed Concrete Association, one for those interested in state and district associations, and the annual luncheon business meeting of the Manufacturers Division.

In accordance with accepted policy, there was only one organized social function, the annual reception and buffet dinner given by the associate members. The one scheduled function for the ladies was a brunch at which there was a talented speaker.

The associations continued their practice of scheduling a minimum of scheduled social functions in order that individuals might make their own entertainment plans in the convention city. Also, there was a minimum of outside speakers in preference to the informal type of discussions which are arranged for maximum audience participation in the discussion of industry problems.

One notable exception this year was an inspiring talk by Clarence Manion of Notre Dame University before a joint luncheon. Dean Manion is author of "The Key to Peace" and his talk had profound practical significance concerned with the national and political picture.

The main subjects considered in the general meetings, of interest to both industries, and in the separate sessions for sand and gravel producers included the outlook for construction in 1952, suggestions for meeting the highway problem, the highway program in Illinois, the effect of controlled axle loadings on highways, the influence of aggregates on concrete pavement durability, price control, percentage depletion, discussions of priorities and wage and salary regulations, employer-employe relationships, plant operations, zoning and bituminous mixtures.

Addresses of both presidents and combined reports of the executive secretary and the director of engineering for both associations were given at a joint session opening the convention.

Reports of special interest to producers of ready-mixed concrete, and certain subjects considered in the joint sessions, are published in the CONCRETE PRODUCTS section of this issue, where the principal report of the N.R.M.C.A. convention is published. This report, of the N.S.G.A. meetings, necessarily also covers many topics of interest to ready-mixed concrete producers as they were presented in joint sessions.

Presiding Officers

Harris N. Snyder, retiring president of the National Sand and Gravel Association, presided over the opening joint session which heard the presidential addresses, two papers on highways and a talk on the effect of the defense program on construction. President-elect A. R. Shiely was presiding officer for a joint session which had three papers on the subject of highways and concrete pavements. Norman J. Fredericks was presiding officer for the joint luncheon. An open forum discussion on price control as it applies to the sand and gravel and ready-mixed concrete industries was under the chairmanship of Herbert G. Jahncke. Percentage depletion in all its aspects was the subject of a session presided over by John W. Murphy. Priorities and wage and salary regulations required a full joint session for discussion with executive secretary V. P. Ahearn as moderator. Quentin Best was chairman of a joint session on labor relations; J. L. Shiely, Jr., for the sand and gravel operating session, and R. E. Weaver presided over the closing session at which zoning restrictions and bituminous mixtures using sand and gravel were discussed.

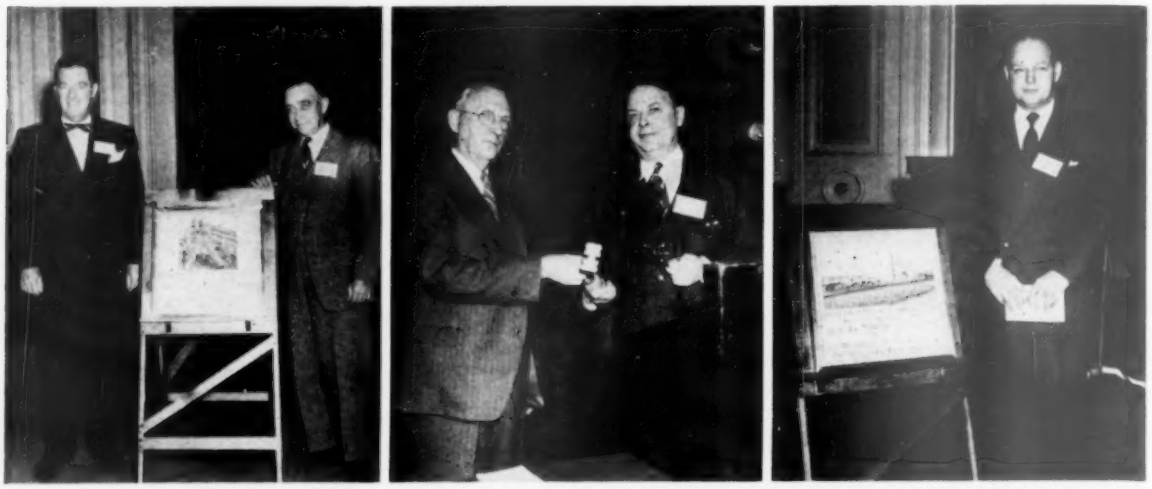
Officers

Albert R. Shiely, J. L. Shiely Co., St. Paul, Minn., was elected president of the National Sand and Gravel Association, succeeding H. N. Snyder. John W. Muhpry, Union Sand and Gravel Co., Spokane, Wash., was elected vice-president and R. E. Weaver, Lincoln Sand and Gravel Co., Lincoln, Ill., was elected secretary-treasurer. Elected to the executive committee were Robert H. Baker, Dixie Sand and Gravel Corp., Chattanooga, Tenn.; E. Phil Gemmer, Texas Construction Material Co., Houston, Texas; William Edward Hole, American Aggregates Corp., Greenville, Ohio; and E. K. Davison, J. K. Davison & Bros., Pittsburgh, Penn. The officers complete the executive committee.

Elected directors at large were Charles E. Brady, Lilesville, N. C.; John W. Roberts, Richmond, Va.; Stephen Stepanian, Columbus, Ohio; J. P. Calhoun, Columbus, Ga.; and C. A. Chipley, San Antonio, Texas.

Kenneth Tobin was named assistant executive secretary of both associations; Mrs. Himmler, of the Washington staff, is assistant treasurer and Mrs. Grace Sharp's new title is assistant to the executive secretary.

Overflowing the exhibition hall, the machinery exposition had some heavy equipment displayed in adjacent parking lots and other displays on the mezzanine



Left: Quint Best, vice-president of Consolidated Rock Products Co., Los Angeles, Calif., left, and Frank Carroll, superintendent of Irwindale, Calif., plant accept safety trophy. Center: Retiring president of N.S.G.A., H. N. Snyder, left, turns gavel over to president-elect Albert R. Shiely of St. Paul, Minn. Right: J. M. Dowdy, Memphis, Tenn., poses beside safety trophy awarded to sand and gravel plant of Marquette Cement Manufacturing Co. for winning large-plant competition

Safety

Safety trophies awarded by ROCK PRODUCTS to the winning plants in the National Sand and Gravel Association safety competition for 1950 were presented to the winning companies by R. E. Weaver at the concluding session. J. M. Dowdy accepted the trophy for Marquette Cement Manufacturing Co., winner in the large-plant classification at its Memphis, Tenn., sand and gravel plant. In receiving the trophy Mr. Dowdy gave credit to president Wecker of his company for sparking the drive for safe operations, and to other officials of the company down the line.

Quentin Best of Consolidated Rock Products Co., Los Angeles, Calif., received the trophy for the Irwindale, Calif., plant, winner in the medium-sized plant classification. Frank Carroll, superintendent of that plant, was also present, it being policy of the company to reward the superintendent of any of its plants which win a trophy with a trip to the convention.

Thomas Popplewell accepted the trophy for the Kingsbury plant of the Fort Worth Sand and Gravel Co., at Euless, Texas, winner in the small-sized plant category. Three plants of this company had accident-free records in 1950.

President's Report

President Harris N. Snyder, Buffalo, N. Y., of N.S.G.A., was presiding officer for the opening general session of N.S.G.A. and N.R.M.C.A. Before presenting his opening address, Mr. Snyder read the names of seven prominent past and present members who had died during 1951, in whose memories the convention rose and paid their respects with a silent minute of prayer.

These men were Eric Ryberg, a past director and member of the executive committee who was an honorary member of the board; V. O. Johnston, president of N.S.G.A. in 1920-1927; Hugh Haddow, Jr., president in 1928-1929; Donald Reynolds, a member of the executive committee at the time of his death; H. P. Caldwell, a past member of the board of directors; and Otto Ellingen, a charter member.

Mr. Snyder expressed his pleasure that this convention, the 36th, was the largest yet held and he acknowledged the excellent cooperation received from the Manufacturers Division which had assembled the largest exhibit of machinery and equipment in history. He also acknowledged the excellent relations he had enjoyed with the staff, the board of directors and committees during his two-year term of office, and he expressed the appreciation of the association for the contributions of the trade papers serving the industry.

Many of the association accomplishments of the past year were touched upon to refresh the minds of those who might take for granted the many things that have been done for their benefit at small cost. During the year, more than 100 executive letters were sent the membership from executive secretary V. P. Ahearn's office, many of them interpreting government regulations, and director of engineering Stanton Walker sent out eight informative technical information letters in 1951. On the subject of engineering activities, he singled out the annual short course as of outstanding value to the industry.

The outstanding single accomplishment during 1951, in Mr. Snyder's opinion, was the inclusion of percentage depletion allowance for sand and gravel in the Revenue Act of 1951. J. Rutledge Hill, Dallas, Texas, chairman of the taxation committee, his committee, the association staff and special counsel were commended for their sustained effort in obtaining this tax relief. In Mr. Snyder's own words, the industry will always be indebted to Mr. Hill for this accomplishment.

The association continues to be healthy both in membership growth and in financial position and, said Mr. Snyder, has been fortunate in the caliber of its staff. As for the future, qualified trainees are being taught the philosophy and technique of both Mr. Ahearn and Mr. Walker to guarantee carrying on the work, as assistants.

As for research, he cited the work being done by the portland cement industry and other organizations with which the sand and gravel industry must keep pace. The public with which the industry will deal in the future is to be much more technically informed than today, he said, in advocating that the industry keep pace, through knowledge gained by its own studies, otherwise it would find itself in a position of accepting the determinations of others.

Touching upon the future market, he quoted McGraw-Hill editors as saying that as of the end of October, 1951, there was a backlog of engineering construction projects totalling $61 billion. According to the Association of State Highway Officials, there are 72,000 bridges on the federal aid system alone that are substandard and the federal system represents less than 20 percent of the nation's roads. While steel shortages and emergency regulations are holding up the construction program now, he said that it is important that planning go forward now in anticipation of changed conditions. In this respect he urged producers to participate in their com-

munities, in plans for the time when restrictions will be eased. This activity would be in cooperation with good road associations, planning boards, highway users conferences, automobile clubs or similar organizations.

The keynote to Mr. Snyder's address was that the industry give more thought and take action in those activities, outside industry matters, which will contribute to maintenance of the foundation on which the future of the nation will be assured. He urged support of worthwhile and patriotic educational institutions, of youth programs designed to improve moral stamina and to install loyalty to the nation, and of institutions that teach moral and spiritual values to both young and old, as represented by many churches.

He plugged hard for everyone to vote and get out the vote in order that the nation have a majority rule. During the last presidential election, only one-half of the eligible voters went to the polls, he said, and we can well fear that a majority of one-half of the eligible voters may represent the element that think we should adopt some form of socialistic, welfare or totalitarian government under the rule of minority of about one-fourth the eligible voters. In closing, he urged that the industry take the time to give its support to those activities that will be insurance for the future.

EXECUTIVE SECRETARY'S REPORT

EXECUTIVE SECRETARY V. P. Ahearn presented a consolidated annual report before a joint session of the two associations. Each association is in excellent financial position to carry forward a progressive program of activities and has had its membership enlarged substantially. Mr. Ahearn's report thoroughly covered the principal activities affecting and relating to both industries.

According to Mr. Ahearn's figures, expenditures for new construction in 1951 were nearly $20 billion, an all-time record 7 percent higher than the 1950 total, due mainly to larger public outlays for military construction, defense plants and schools. However, due to higher construction costs, physical volume put in place was only slightly over 1950 levels.

Expenditures for new industrial construction in 1951 nearly doubled the 1950 volume, and private financing was responsible for $20.8 billion of new construction in 1951. Public construction expenditures went up 27 percent over 1950. According to U. S. Bureau of Labor Statistics there was, however, a gradual reduction in total construction in the last half of 1951 from the record level of the preceding 18 months, which indicates a depressing effect on total volume of new construction in 1952.

Total construction expenditure figures for 1951 surpassed his predictions of a year ago, said Mr. Ahearn to emphasize that predictions even when based on reliable sources are nevertheless hazardous during these uncertain times. One factor was the higher wage and transportation rates which could not be predicted.

Prospects for highway construction in 1952 are discouraging, in Mr. Ahearn's opinion, because of drastic limitations on steel for the purpose. He is concerned with N.P.A.'s attitude toward highways in view of the fact that adequate highways are essential to a strong economy.

Sand and Gravel Production

Production of sand and gravel totalled 370,455,000 tons valued at $295,040,000 in 1950 of which 257,556,631 tons were commercial production valued at $241,324,644. Average price of commercial sand and gravel was 94 cents per ton. All of these figures represent new records. Production in 1950 exceeded the 1949 figure by 16 percent while value was up 19 percent. Mr. Ahearn's estimate was for a 10 percent increase in production, as predicted a year ago, which proved too low. Figures for 1951 are not yet available from the U. S. Bureau of Mines but another increase, over 1950 tonnages, is indicated.

While the nation will undoubtedly be kept busy for many years, when materials and financing are available, in catching up with the construction deficiency, the outlook for 1952 is considered unpredictable. Some decline as compared with 1950 and 1949 is anticipated under conditions as they exist now.

In commenting on the acute problem of inadequate reserves of sand and gravel, Mr. Ahearn pointed out that the industry produced more than three billion tons over the 13 years before 1951, and is the largest producer of construction materials.

Touching upon the percentage depletion allowance granted for sand and gravel, he paid high compliment to J. Rutledge Hill, Dallas, Texas, and also to William Edward Hole, Greenville, Ohio, and Charles E. Brady, Salisbury, N. C., who assisted Mr. Hill in presenting the case for the industry before Congressional committees. He also paid tribute to Covington and Burling, the association general counsel, and special counsel George Uzzell, Salisbury, N. C., for their efforts in helping obtain percentage depletion.

Mr. Ahearn spoke about the shortage of sand and gravel developing in certain areas and factors that are increasingly aggravating the problem. Among them are zoning restrictions and strong public interest in rehabili-

Joint luncheon of National Sand and Gravel Association and National Ready Mixed Concrete Association. Left: J. Rutledge Hill, standing, receiving silver service in appreciation of his work as chairman of the N.S.G.A. committee on taxation. Right: Clarence Manion, dean of the law school, Notre Dame University, presented a thought-provoking address on the part that everyone must play to guarantee good government

tation, political support behind measures to stop stream pollution, and greatly increasing costs of land. To sum it up, he said that these problems are growing and here to stay, necessitating that the industry recognize the need for a sound policy of good public relations.

Ready-Mixed Concrete Production

As to the production of ready-mixed concrete, his figures were based on reports from member companies which represent about 80 percent of the total annual production. The estimate is that approximately 38,000,000 cu. yd. were produced in 1951 as compared with 34,100,000 cu. yd. in 1950, requiring nearly 50,000,000 bbl. of portland cement. Based on an estimated value of $12 per cu. yd., the volume was $450,000,000. Thus, the two industries produced $700,000,000 worth of product in 1951.

There were serious and sustained cement shortages in several cities during 1951 but it is believed that increased production capacity of the cement industry will prevent sustained cement shortages anywhere in 1952. The idea of ready-mixed concrete is still growing, and it was stated that the potential market has not yet been realized. The association will continue to work closely with the cement industry in their mutual interests.

Price and Wage Regulations

Mr. Ahearn was bitter in his comments on dealings with O.P.S. and the government's extended procrastination in relieving the industry of necessity to absorb the additional cost of out-of-area cement. As a result, the industry, which is composed of small companies, was required to absorb out of limited (if any) profit margins an extra cost over which it had no control. Because of this, a large number of small companies were forced by the government to do business at a loss. After much pressure, O.P.S. issued an order which had the effect of adding to the confusion and which would have required more accounting records and personnel than the average company could afford. Relief came long after the need was apparent.

Both the sand and gravel and ready-mixed concrete industries are still subject to the General Ceiling Price Regulation and there is no provision for relief. The ready-mixed concrete industry is now required to absorb, except for cement from out-of-area sources, added in-bound costs of transportation of the ingredients of concrete and sand and gravel producers are required to absorb transportation cost increases where they sell on a delivered price basis. It is hoped that the two industries may be issued an order to pass along transportation increases but Mr. Ahearn fears O.P.S. may delay action indefinitely. The Capehart amendment is not of value to most members of the industry. The association is seeking a tailored order or an amendment to the GCPR for price relief.

As to wage and salary controls, Mr. Ahearn summed up the regulations and referred to executive letters of interpretation already sent out from his office. Members of the National Ready Mixed Concrete Association will soon receive details of the group insurance plan to be launched. Use of the plan will be optional to member companies.

Priorities and the M-78 order of D.P.A. which covers the sand and gravel industry, and regulations of N.P.A.'s Building Materials Division which apply to ready-mixed concrete were briefly discussed. Mr. Ahearn was highly complimentary of George H. Roll, of D.M.A. and Delmar Runner of N.P.A., both engineers, for their understanding of the industry's problems and their cooperation.

Taft-Hartley Act

The Taft-Hartley Act, while under considerable interpretation by the courts and the National Labor Relations Board, may be amended from time to time but, said Mr. Ahearn, the basic principles are part of our permanent law and public interest will not permit repeal of the act. The act has been extremely important to the sand and gravel industry because it has done more than anything else to prevent the imposition of secondary boycotts on individual companies.

While there were attempts last year to scuttle area bargaining, the courts have rejected the effort and the integrity of area bargaining is unimpaired. Area bargaining is a growing practice in the two industries as preferred to individual bargaining in the administration of labor agreements. The associations are continuing their efforts that no member be isolated, in collective bargaining or in dealings with employes if they are not unionized, by inadequate or misleading information. To this end, frequent reports on rates of pay, hours of work and conditions of employment are sent to members and a publication has been provided for guidance in collective bargaining agreements. Mr. Ahearn has noted marked progress in the quality of labor agreements.

In his comments on the settlement of disputes, he said that a failing is that unions and employes regard permissive wage increases as amounting to a government order for the employer to pay them. He cautioned that members not bargain with unions on the basis that they would be willing to pay more but are not permitted to do so by regulations and, in his opinion, the Consumers' Price Index as used by General Motors may be wholly unworkable in these industries. As far as the Construction Industry Stabilization Commission is concerned, the two industries come under its control for wage purposes only if a plant is set up to serve a specific project.

Government Activities

The sand and gravel industry will be exempted from renegotiation under the Renegotiation Act of 1951 and the N.R.M.C.A. will file for exemption of ready-mixed concrete.

Another development of 1951 important to the sand and gravel industry was Section 453 of the Internal Revenue Code which permits a producer operating more than one mineral property to treat them as one in computing exempt excess output. J. Rutledge Hill, Dallas, Texas, played an important part toward gaining this concession.

The Korean crisis made it impossible for the industries, along with others, to obtain repeal of the 3 percent tax on the transportation of property for hire. The pricing confusion as a result of the Supreme Court decision in the cement industry has not been cleared up and the ready-mixed concrete industry has, as a result, had to pay greatly increased prices for cement where many cement manufacturers adopted an exclusive plant pricing policy. Re-instatement of competitive pricing for cement, said Mr. Ahearn, is essential to stability of the ready-mixed concrete industry.

Radio licenses will not be granted to companies which merely deliver sand and gravel or ready-mixed concrete, but producing or manufacturing concerns which pass certain other requirements must show that the operation is in a remote or sparsely settled area, or that the operation has to be a construction project of public character, or that the use of a radio is required within the yard area of a single plant. Then a license can be granted.

Mr. Ahearn summarized the National Sand and Gravel Association's intervention in Ex Parte 175 of the Interstate Commerce Commission which resulted in an increase of 9 percent in interstate rates in the eastern territory and 6 percent in the rest of the country. The National Ready Mixed Concrete Association also intervened. Both industries are still being forced to absorb the increases imposed without O.P.S. relief, and the carriers likely will be granted a further increase. Car supply continues to be a problem for both industries and many cars arrive in dirty and poor condition.

Association Activities

Mr. Ahearn was pleased with the increased interest being shown in the safety programs of the two associations and urged that every member company participate in the annual safety competitions as an important part of good management. He repeated that the principal executive of

A group of West Coast producers had a get-together dinner at the Conrad Hilton's Boulevard Room

each member company must accept safety as his personal responsibility.

The associations have continued their policy of holding regional meetings and, during 1951, Mr. Ahearn personally attended meetings in 18 cities, some in conjunction with meetings of state and district associations. A close working arrangement between national and state associations was given strong endorsement.

The National Sand and Gravel Association now has 218 active members and 77 associate members, the largest in history. During 1951, 36 new active members and 10 new associate members joined the association. National Ready Mixed Concrete Association also has an all-time high membership, of 500 active members and 73 associate members. In 1951, 71 new active members and 13 new associate members were added.

In conclusion, he expressed his appreciation to president Harris Snyder of N.S.G.A. and president Norman Fredericks of N.R.M.C.A., to the other officers, members of the boards of directors, committee members and all members for their friendly interest in the associations and for their cooperation.

Report of Director of Engineering

Stanton Walker, director of engineering for the National Sand and Gravel Association and the National Ready Mixed Concrete Association, presented his annual report at a session which also considered concrete highways. It was Mr. Walker's 27th annual report to the sand and gravel producers and his 22nd to the ready-mixed concrete group.

He outlined briefly the purpose and scope of his organization and the working agreement with the University of Maryland. He called attention to the fact that the University of Maryland can veto any proposed research work but the measure of their joint interests in research is indicated by the fact that to date no proposed research has been vetoed by the university officials. Mr. Walker has three full-time laboratory assistants, two of whom are graduate engineers, and some part-time student help.

The research work has dealt mainly with concrete, with emphasis on its durability. This phase of his supervisory work has included effects of admixtures of a pozzolonic nature, and of admixtures or additives of an air-entraining nature, along with different kinds of cements and their action in concretes.

Mr. Walker described reactive aggregates as being hydrous, or glassy, silicates which react harmfully with soluable sodium and potassium in portland cement. He feels that the solution lies in two categories: (1) use a low alkali cement, and (2) use an aggregate containing no reactive aggregates. He also covered briefly the use of pozzolonic materials to inhibit the harmful reactions. One of the admixtures mentioned by Mr. Walker was fly ash, which he said was not always the same, nor always equally effective.

In addition to handling individual problems, the laboratory has done some work on railroad ballast and has united with other large research organizations in joint attempts to solve some of the problems of better concrete. Mr. Walker spoke of the preparation of many papers for publication, and for delivery before various groups, citing one given at the February, 1952, meeting of the American Concrete Institute.

One of the many phases of work accomplished under the supervision of the director of engineering was the short course on concrete designs. The next course will be the seventh such held. It has been proposed that one or two graduate engineers be permitted to serve an internship in the association's laboratory. Such an internship would last for about 10 weeks.

Mr. Walker said that since specifications are becoming more and more restrictive and depletion of deposits is more of a factor, greater beneficiation of borderline materials is in sight. In closing, he said that some interest was expressed regarding the effect of the use of lightweight aggregates upon the heavy aggregate producer. Mr. Walker felt that, generally speaking, the effect was not important from a sales viewpoint. Locally there might be a few exceptions.

Truck Loading

Fred Burggraf, director, Highway Research Board, gave a talk on the "Effect of Controlled Truck Axle Loading on Highways." Mr. Burggraf used slides to illustrate his talk, which was concerned with the Maryland test roads. He described the road tests as being a series of controlled truck haulage tests over a specially built highway strip. The trucks were of different types and designs and carried variable weight loads. Some 50,000 trips were made by these trucks on both day and night hauls, at various speeds, and by the use of special instruments and strain gauges the effect of axle loadings on the highways was observed. The highway was made of 68 sections, includ-

ing concrete, brick and asphalt. Strains and deflections resulting from some 400,000 truck-miles were noted and the data used as the basis for better highway design and for axle loading limitations.

The speaker prefaced his remarks by reference to the Illinois road tests made in 1922 and 1923 in which concrete, brick and asphalt roads were tested.

The test traffic consisted of Liberty trucks equipped with solid tires. The rear axle loads varied from 5000-26,000 lb. applied in increments of approximately 2000 lb. Most of the sections were subjected to about 50,000 truck trips with gradually increasing loads. The trucks were operated at a speed of 12-15 m.p.h. over the test sections during both day and night, with about 18,000 truck trips at night.

For the plain concrete sections the investigation revealed that for an axle load of 16,000 lb. and for concrete having a modulus of rupture of 730 p.s.i., an 8-in. pavement was required.

The principal object of the Maryland test, the speaker said, was to determine the relative effects on a particular concrete pavement of four different axle loadings—two single axles and two tandem axles.

The tests were conducted on a 1.1-mile section of concrete pavement on U. S. Route 301, approximately nine miles south of La Plata, Md. The pavement consisted of two 12-ft. lanes each having a 9-7-9 in. cross section, both reinforced with wire mesh. Expansion joints were spaced at 120-ft. intervals with two intermediate contraction joints at 40-ft. spacings. All transverse joints had dowel bars ¾ in. in diameter at 15-in. spacing and the adjacent lanes were tied together with tie bars 4 ft. long spaced at 4-ft. intervals.

In its operation the test consisted primarily of comparing the relative effects of 18,000- and 22,400-lb. single rear axles and 32,000- and 44,800-lb. tandem rear axles on the reinforced concrete pavement.

Included in these tests were approximately 9000 individual strain readings, 3000 individual deflection readings and 2500 readings for the development of the influence lines data. More than 1400 soil samples were taken from the open trench along both edges of the pavement and from the 128 core holes drilled in the pavement. It took several months to make the more than 3000 soil tests on these samples.

In his summary of major findings relating to soil tests Mr. Burggraf pointed out that no pumping or cracking of pavements occurred in either single axle loads where nonplastic granular soils with less than 9 percent passing the No. 200 sieve was used as a subgrade.

Slight pumping but no cracking occurred on the 22,400-lb. single axle loads on granular soils containing more than 9 percent passing the No. 200 sieve.

Mr. Burggraf gave some interesting results, as follows: "The progress of cracking and depression of the joints and edges of the pavement was definitely related to the occurrence of pumping. The average amounts of cracking in lineal feet per slab (40 ft. long, 12 ft. wide) were as follows:

	Cracks, l. ft./slab	Truck applications
For the period ending October 13:		
18,000-lb. single axle	None	152,876
32,000-lb. tandem axle	4	92,363
22,400-lb. single axle	13	146,332
44,800-lb. tandem axle	50	92,166
For the period ending December 23:		
18,000-lb. single axle	4	238,281
32,000-lb. tandem axle	15	164,523
22,400-lb. single axle	28	238,263
44,800-lb. tandem axle—discontinued Oct. 13.		

"The lineal feet of cracking were markedly greater in the vicinity of expansion joints than at contraction joints.

"Cut and fill sections were about equally susceptible to pumping, but the average amounts of cracking per slab were greater in cut than in fill sections.

"Under the continued action of loads operating on all four lanes from June 23 to October 2, the joints of the slabs laid on A-6 soil were depressed an average of 3/16 in. on the 18,000-lb. axle load lane, ¼ in. on the 32,000-lb. lane, ⅜ in. on the 22,400-lb. lane and ⅞ in. on the 44,800-lb. lane.

"The occurrence of pumping and cracking of the pavement under the 18,000-lb. single axle load in sections laid on the A-6 soil showed that the combined supporting ability of the pavement and subgrade in these sections was slightly less than adequate for the axle load of 18,000 lb. applied in the frequency of the test applications (an average of 1319 per day). In combination with subgrade support of identical character, the pavement was substantially inadequate for the 22,400-lb. single axle applied in the same frequency. Laid on this same class of soil the pavement proved to be less adequate for the 32,000-lb. tandem axle loads (average rate of application 910 per day) than for the 18,000-lb. single axle loads and substantially less adequate for the 44,800-lb. tandem axle loads (average rate of application 884 per day) than for 22,400-lb. single axle loads."

It was evident that the present 18,000-lb. axle load limit, the maximum now prescribed in the laws of 34 states, did have a factual basis, as reviewed by the speaker.

The speaker told of a similar road test to be conducted in Idaho on two loops, both specially built. There will be various thicknesses of subgrades and blacktop. The test is expected to take place in late summer or early fall. The loops will be used for unidirectional driving with trucks and semi-trailers of varying weight loads. It will cost approximately $400,000. The Maryland road tests were said to cost about $250,000.

Aggregates in Paving

K. B. Wood, associate director, Joint Highway Research Project, and professor of highway engineering, Purdue University, Lafayette, Ind., gave a talk, "Influence of Aggregates on the Life of Concrete Pavements." Professor Wood prefaced the showing of a motion picture by emphasizing that, although half of the film was devoted to bad highways, actually 95 percent or more of the state highways in Indiana are in good condition and 5 percent, or less, are in various stages of disintegration.

His paper concerned coarse aggregates only. He said that just a few sources of coarse aggregates account for most of the troubles and that 30 percent of the difficulties stem from one source. These sources, he said, are not at present processing any aggregates. The movie showed the changes in road appearance with the changes in aggregates. The speaker felt that there is a need for specifications covering the quality of aggregates that would in the future prevent the use of inferior materials.

In the discussion, a member from the floor asked the qualifications of an inferior material. Professor Wood answered that, generally speaking, any aggregate that absorbs water rapidly should be looked upon with skepticism.

Concrete Pavements

G. Donald Kennedy, consulting engineer and assistant to the president, Portland Cement Association, spoke on the subject, "Concrete Pavements—Their Utility and Future."

Mr. Kennedy reviewed the history and developments of concrete designs that would tend to increase life and provide maximum economy for highway service. He briefly discussed air entrainment, saying that it has been one of the greatest strides in concrete design in recent years, and pointed out that the air spaces in such concrete tend to absorb freezing stresses.

He called attention to the fact that pumping action can be stopped by an adequate subgrade that would drain that area. Mr. Kennedy pointed out that the subject of soil has developed into a science and the findings of soil technicians are being correlated into better highway designs, including the elimination of expansion joints (transverse) and fewer contraction joints. He urged all in attendance to take part in the "P.A.R.," a movement to Provide Adequate Roads.

Joint Luncheon

At the joint luncheon, Norman J. Fredericks, president of the National Ready Mixed Concrete Association, was the presiding officer. Before introducing the main speaker for the

luncheon, Mr. Fredericks called upon Harris N. Snyder, president of N.S.G.A., who said that the outstanding accomplishment for 1951, related to the association, was the percentage depletion relief extended to producers and that J. Rutledge Hill, Dallas, Texas, had done an outstanding job in helping to secure this relief. Mr. Hill was then presented with a silver punch bowl and service.

The main speaker was Clarence Manion, dean of the law school, Notre Dame University, South Bend, Ind., and author of "The Key to Peace." The speaker delivered a forceful talk calling attention to the efficiency of business men, producers, engineers and similar persons in daily business life, and to the lack of applying this valuable trait in the science of politics. Much of this he attributed to a fog that has descended over them because of the concentration and centralization of government in Washington, D. C. He pointed out that by following the constitution of the United States and the Ten Commandments the need for concentration of power in Washington would be eliminated, billions would be saved from military spending and the world would become a better place in which to live.

ZONING REGULATIONS

WILLIAM EDWARD HOLE, president of American Aggregates Corp., Greenville, Ohio, who reported on the problems of zoning and land rehabilitation two years ago as chairman of the N.S.G.A. committee on zoning and land rehabilitation, re-stated the problems in the light of subsequent developments in a paper "The Growing Problem of Zoning Restrictions." His paper re-emphasized that zoning in rural and suburban areas throughout the United States is a serious threat to the sand and gravel industry. Mr. Hole's company is the largest producer in the nation, with many plants, and has taken the lead in meeting the problem through an effective program of public relations of which a planned program of land rehabilitation is an important part.

Mr. Hole substantiated that many courts have legally sanctioned comprehensive zoning since the right of a village to zone land exclusively for residence purposes was established in 1926. Zoning laws, however, must serve a public interest and must not be capricious, arbitrary or unreasonable so it follows that any legal zoning plan may be enforced against all real estate covered by the plan irrespective of the injury, damage and loss that results.

Many sand and gravel producers with large reserve deposits have been indifferent, said Mr. Hole, because they have believed they were immune because of the generally accepted doctrine of non-conforming uses. This doctrine which would protect a producer from a zoning plan adopted subsequent to the inception of use of land for other purposes than specified in the zoning plan is being vigorously challenged. The U. S. Chamber of Commerce has stated that police power can be invoked to oust existing non-conforming uses, in a pamphlet concerned primarily with urban zoning but, pointed out Mr. Hole, the principle applies with equal force to rural zoning. He urged producers not to consider themselves safe because their operations were established before a zoning law was written.

Most states have passed legislation on rural zoning which authorizes the creation of zoning commissions and the commissions are empowered to submit plans to appropriate local officials. Any such plan as approved by local officials is either adopted or, in some states, must be approved by a majority of the electors.

No reasonable person will quarrel with the proposition that the public interest in populous communities demands the planned use of land, he said, but in regulating land use, zoning should be a means to conserve and protect both rural and urban land so that its economic worth and productivity may be preserved. The trouble has been that zoning has, as a rule, placed restrictions on land use rather than emphasizing the economic desirability and necessity of protecting the most beneficial use to which any area may be dedicated. A similar approach has been applied in rural zoning, thus limiting commercial and industrial expansion in suburban and rural areas. In most ordinances any other land use other than for agricultural purposes or residential development requires protracted and costly procedures for amendment or variation.

In Mr. Hole's observation, zoning as presently applied to suburban and rural areas, usually is not in the interest of maximum productive potential. He believes that the difficulties caused by zoning can, however, be resolved for the public good by a program of intelligent business statesmanship. The trouble has been that industry leaders by collective efforts have sold the public and zoning authorities on the fact that industry is the prime base of any community's economic life.

Industry's Role in Zoning

While the industry has failed to tell its story, he said it was not too late to have the industry needs provided for in zoning amendments and arranging for their inclusion in new rural zoning ordinances. It remains for the story to be told that sand and gravel are important to the economy, must be excavated at times and places for most economic use, can only be extracted from areas where they are found and that population growth has encroached upon areas bearing needed sand and gravel. The important part of transportation in costs to the consumer must also be emphasized and also the fact that a sound land development and utilization program requires a balancing of interests for the common good.

Mr. Hole cited results from a recent survey that reveal continuing zoning problems coming into all populous communities. He told of a recent case of his own company where a deposit 40 miles from Detroit, Mich., was optional and tested. Application to have the area zoned for sand and gravel production was denied and the proposed development was abandoned to the economic disadvantage of the community.

In cases like these, the trouble is that zoning ordinances do not provide a long-range correlated plan to control the character and extent of urban dispersion, and they generally blanket rural areas bordering highways under a single-family dwelling classification. Substandard developments that follow cause the greatest objection to the continuance and expansion of operations, in Mr. Hole's experience. This threat to operations might have been minimized, in his opinion, if in the early period of rural zoning, producers had actively cooperated in the formulation of zoning plans and ordinances.

Growth of Zoning Concept

Mr. Hole outlined the history of zoning legislation in Marion county, Ind., and the effects on his company, as an example of the growing maturity of the zoning concept. The sand and gravel industry in Indiana took no part in the early framing of the legislation whereas, if they had, the enabling statutes likely would have contained appropriate safeguards for the industry. His company had no success in having a master zoning ordinance enacted in November, 1948, changed to consider the needs of the sand and gravel industry.

In the Marion county ordinance, sand and gravel were classified with 60 other types of business, all having nothing in common with the sand and gravel industry and many of which were considered undesirable by the public. If a case was presented to rezone a rural area for sand and gravel purposes, the people would object because the re-zoned land might then be subjected to any of the other 60 uses including blast furnaces, glue manufacturers, slaughter houses and other.

As a result of efforts of the company, the ordinance was amended in

1949 to provide for the creation of special sand and gravel districts, which followed closely the Ohio statute relating to the rehabilitation of coal strip mine areas. It constituted recognition that sand and gravel operations should not always be included in the heavy industry classification. Cooperative effort, and with the aid of the Indiana Mineral Aggregates Association and other organizations, resulted in a 1951 amendment to place the sand and gravel industry in a special use classification. While the problem is now less acute, applications for re-zoning must still be filed and involve much debate in prolonged hearings.

Most people consider the industry as an undesirable one, he said, which does not place it in good position, when acting alone, to influence zoning law changes. He cited many shortcomings of operations which have led to that thinking, among them poor housekeeping, hazardous conditions being allowed to exist, indifference to the rights of adjoining land owners and noise. Importantly, the public is looking for evidence that the industry has a plan for the rehabilitation of worked-over pit areas and Mr. Hole strongly urged producers to adopt the practice to improve their public relations. He mentioned the coal strip mining industry, as an example of an extractive industry that has been forced into land rehabilitation at great expense, which might have been done at much less expense had reclamation been keyed to operations earlier.

American Aggregates Corp. has prosecuted many land rehabilitation programs over a period of more than 20 years under the direction of Fred D. Coppock, past president and founder of the company. It is established policy to consider land rehabilitation equally important to the production of sand and gravel, and plans for rehabilitation and production are planned and concurrently executed. The practice has been found richly rewarding, in every respect, according to Mr. Hole. Practices of land reclamation and rehabilitation by American Aggregates Corp. were described in the January, 1951, issue of ROCK PRODUCTS, page 110.

Following Mr. Hole's talk, Mr. Ahearn called attention to the rapid growth of our population and its growing influence in aggravating the zoning problem. Population in 1960 will be 60-65 percent greater than it was in 1900 and, as a result, zoning restrictions will be the most overwhelming problem facing the sand and gravel industry in the years ahead. It is the job of company presidents, he said, to participate in zoning hearings. State associations, which he and the N.S.G.A. endorse, will be called upon to play a strong part, this problem being one to be attacked at the state level.

PERCENTAGE DEPLETION

GRANTING OF 5 PERCENT depletion for sand and gravel in the Revenue Act of 1951 was without question an outstanding achievement of the past year for the industry and J. Rutledge Hill, president, Gifford-Hill & Co., Dallas, Texas, was largely responsible for gaining that important concession from Congress. (For his efforts, he was presented a handsome silver punch bowl and service as a token of the National Sand and Gravel Association's indebtedness and appreciation of his efforts, before a joint luncheon of both associations.)

Mr. Hill, as chairman of the National Sand and Gravel Association's committee on taxation, was the association's witness before the Ways and Means Committee of the House of Representatives and the Finance Committee of the Senate. He pioneered the idea that the industry met the statutory test for percentage depletion. Mr. Hill reviewed the developments which led to recognition by Congress of the industry's need for percentage depletion and outlined the association program to keep the idea of percentage depletion before Congress in order to oppose further attempts to abandon percentage depletion for industries which now receive the benefits.

Percentage depletion, as expressed by Mr. Hill, is a permit for the industry to remain in business without which, under the impact of high taxes, sorely depleted reserves would be virtually confiscated.

He traced the development of legislation on the subject of "depletion" back from the beginning when, in 1918, Congress first provided discovery depletion which was not extended to the sand and gravel industry. Percentage depletion was first originated in 1926 and was extended to cover mines in 1932 and, in 1942, was extended to cover certain industries. The great demands for sand and gravel during the 1940-1951 period focussed attention on the seriousness of depleting deposits, and the association started action which has continued since 1948.

The hearings and testimony that led up to recognition in the Revenue Act of 1951 were long and drawn out. Those who opposed granting the industry percentage depletion had to be educated to the fact that sand and gravel are not just any such materials but must be merchantable materials to meet specifications drawn to protect the public. They had to be shown that such deposits have limited life and are irreplaceable. In short, a job of education did the trick.

Mr. Hill acknowledged the important assistance given by the National Industrial Sand Association and by all members of the tax committee. Among individuals singled out for special recognition were William Edward Hole, John Murphy, Tom Popplewell, Charles Brady and his attorney George Uzzell, J. P. Calhoun, Congressman Reed of New York, executive secretary V. P. Ahearn, association counsel John Sapienza, assistant executive secretary Kenneth Tobin, engineering director Stanton Walker and the Washington office staff. Mr. Hill also paid tribute to the members of the House Ways and Means Committee and the Senate Finance Committee for their consideration of the plea for percentage depletion.

He urged that efforts be continued to gain the 15 percent allowance originally sought and, in that regard, that every producer stay on the job with his Congressmen and Senators. This combined effort must be to keep the 5 percent depletion and to increase it to 15 percent. It is the industry's job, he emphasized, to sell people high in administrative and Congressional circles on the principle of percentage depletion.

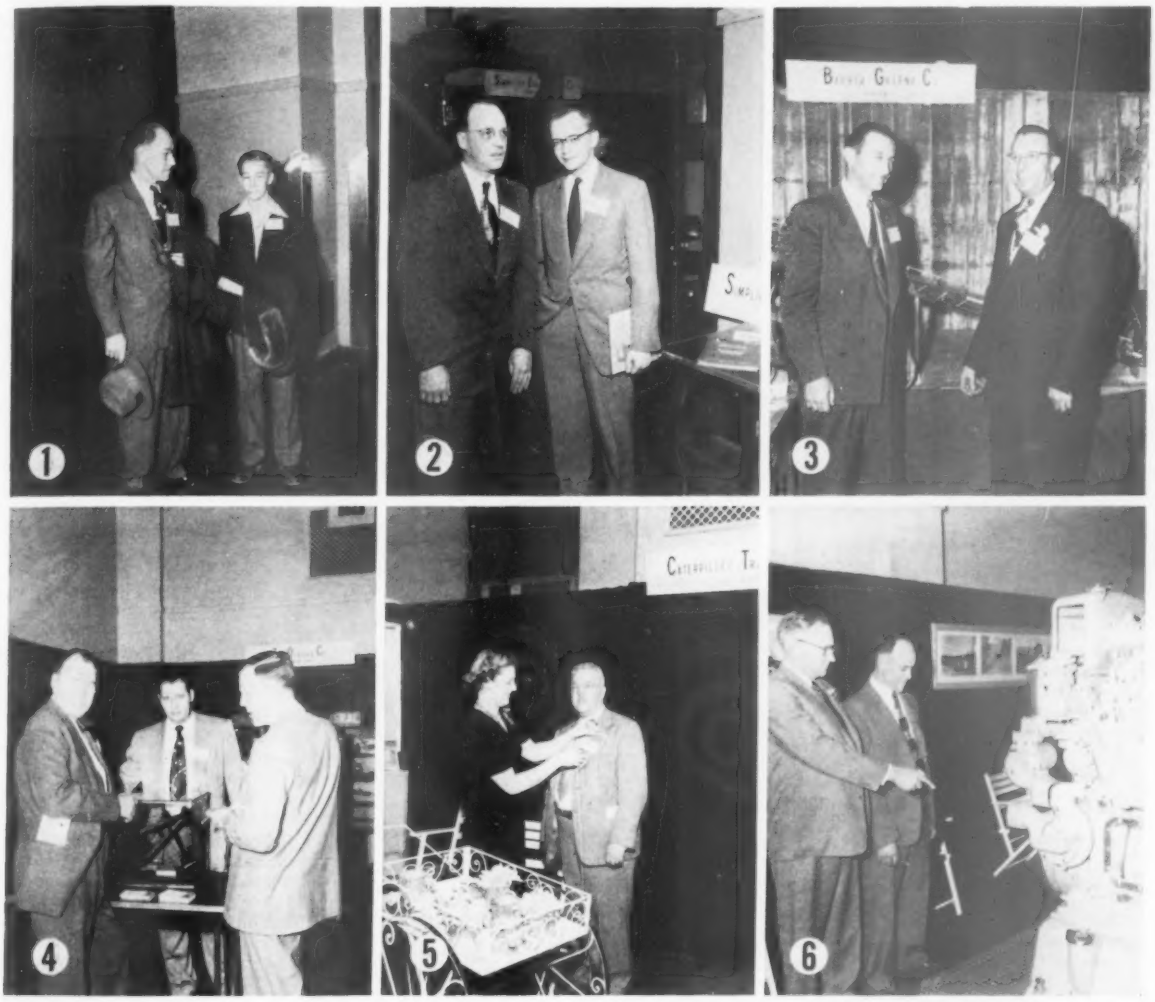
He cited an article in the *New York Times*, January 22, which called attention to the shortages of gravel threatening important construction in many areas as evidence that the story is getting across. This particular article told of gravel shortages, almost equal to the scarcity of steel, in Missouri, South Dakota, North Dakota, Iowa, Nebraska, Kansas, Oklahoma, Kentucky, West Virginia and in parts of Louisiana, Mississippi and Florida.

Application

Following Mr. Hill's talk on percentage depletion, the National Sand and Gravel Association's tax counsel, John T. Sapienza, spoke on the "Application of the Principle of Percentage Depletion." Mr. Sapienza first discussed the various types of depletion, which are cost depletion, discovery depletion which has no application, and percentage depletion, and then he outlined how percentage depletion allowances are applied in the calculation of taxes.

The purpose of percentage depletion allowance, he reminded, is to permit a producer to have sufficient funds for exploration in locating deposits of sand and gravel. He repeated the provision which is that 5 percent of the gross income from the property during the tax-year exclusive of rents and royalties may be deducted provided the deduction does not exceed 50 percent of the net income from the property. If cost depletion is higher, a producer has the choice of taking the greater deduction.

The definition of "gross income" is yet to be determined but, said Mr.



The machinery exposition was well attended. 1—John H. Spicer, left, and Martin Spicer, Spicer Gravel Co., Marseilles, Ill. 2—J. S. Salswedel, left, American Aggregates Corp., Oxford, Mich., and William E. Hole, Jr., son of the president of American Aggregates. 3—Two Alaska producers, Ken Hinchey, left, and Arthur R. Lohr, Alaska Aggregates Corp., Anchorage. 4—George Pettinos, industrial sand producer, studies shovel model. 5—Wayne King, W. S. Tyler Co., past chairman of the Manufacturers Division, gets pinned, but only with a flower. 6— L. R. Falk, left, and L. H. Decklever, Decklever and Falk, Osage, Iowa, inspect machinery

Sapienza, the Treasury Department will attempt to hold percentage depletion allowances to a minimum. Income from the property is considered as distinct from income from a manufacturing operation and is defined as including the ordinary processes to obtain a commercially marketable product. According to the regulations, transportation costs from the pit or excavation to the plant where the ordinary processes take place is included in determining gross income if such transportation does not exceed 50 miles. If a greater distance, it may be allowed upon submitting proof of its necessity.

There are definitions in the statute covering some extractive materials but there is none yet covering sand and gravel. In the case of iron ore, clay, rock asphalt and other minerals sold in the crude form, the operations of sorting, concentrating, sintering and loading are considered as ordinary treatment processes.

For lead, zinc, etc., where the product is not sold in crude form, crushing, grinding, beneficiation, cyanidization, leaching and precipitation are recognized as ordinary treatment processes. The Treasury, he said, may decide that sand and gravel falls in either one of these classifications; the decision will be an important one for industrial sand producers.

In cases where producers lease property, or are lessees, he urged that contracts be made in writing to show rights to depletion benefits. Mr. Sapienza believes that processes of crushing, screening and loading will be permitted in determining gross income for the sand and gravel industry but that there is more question if operations, like grinding, beyond that are involved. He believes the Treasury Department likely will seek repeal of the percentage depletion allowances.

As far as percentages are concerned, end use of the product may determine the allowance. While sand is limited to 5 percent, quartzite may be permitted 15 percent depending on how the Treasury Department construes its use. Chemical composition will be the criterion in determining whether a limestone producer is entitled to 5, 10 or 15 percent depletion.

When regulations are issued they will be published in the Federal Register. Then, conferences will be held and protests heard after which the final regulations will be written.

A lively discussion followed Mr. Sapienza's talk and there were many questions to which only reasonable opinions were given in the absence of

authoritative interpretations. Where a small producer with inadequate records said it was impossible to pinpoint costs of processing, it was suggested that a selling price, if there is one, in the first marketable stage, be used or the alternative is to take the final selling price and start deducting back which might involve some estimating.

In the case of a producer excavating from a river deposit which replenishes itself, the opinion was that there is no depletable interest. That opinion was qualified that if a check revealed the producer to have riparian rights (he owns the land) he may have exclusive rights. Many complicated questions were asked involving river operations. Where a producer has several land operations, each plant should be considered separately. If a producer operates at a loss, he should use cost depletion. Trade discounts should be deducted from the gross before deducting 5 percent.

Government Regulations

An entire session was an open forum on priority ratings, allocation of materials by the National Production Authority, regulations of the Wage Stabilization Board, and regulations of the Salary Stabilization Board. On the four-man panel were George H. Roll, Defense Minerals Administration; M. B. Garber, formerly director of the Construction Machinery Division of N.P.A.; Charles A. Horsky, association counsel, Washington, D. C.; and Kenneth E. Tobin, Jr., assistant executive secretary of N.S.G.A. and N.R.M.C.A. Vincent P. Ahearn, executive secretary for both associations, acted as moderator.

Mr. Roll is in immediate charge of rating assistance and allocation of materials to the sand and gravel industry, and Mr. Garber has just retired from a position where he exercised responsibility for allocations of capital equipment used by the sand and gravel and ready-mixed concrete industries. In this set-up Mr. Roll screens the petitions and Mr. Garber (or his successor in Washington) makes the final decisions.

As one might suspect from the nature of the subjects discussed, many questions and answers revolved around highly technical and legal interpretations of the maze of codes, regulations and directives eminating from Washington, D. C. Because of this and because many of the answers necessarily were opinionated it is difficult to accurately report details of the meeting with any assurance of accuracy. We suspect that when new regulations are forthcoming, previous rulings may be obsolete.

However, we did glean that the Defense Act stipulates that our economy must be kept going and it is difficult for any branch of the defense program to operate without essential building materials—sand and gravel and ready-mixed concrete. This can be illustrated by the relationship of the agstone industry to the limestone industry. The former is a must in our national economy and similarly, a sewage disposal plant is essential to our way of life. On the subject of permissible bonuses, Mr. Tobin indicated that labor bonuses are more liberal than salary, that discretionary profit sharing bonus plans may have difficulty being approved, and that "year end" must be based on previous year-end bonus payments.

Retiring chairman of the Manufacturers Division, Ralph C. Johnson, Simplicity Engineering Co., Durand, Mich., left, extends good wishes to the new chairman, R. D. Ketner, General Electric Co., Schenectady, N. Y.

Many specific questions were asked on the four main topics and one participant from the floor brought out the fact that the Wage Stabilization Board is not functioning as the name implies but is devoting all of its time finding out how to get around directives to raise wages. It was also reported that steel purchased in foreign countries does not affect allotments.

Price Controls

An open forum discussion on price control for sand and gravel and ready-mixed concrete was held during a joint meeting of N.S.G.A. and N.R.M.C.A. Chairman Herbert Jahncke began the meeting by relating the factors affecting his business, such as the loss of men to better paying defense jobs, the increase in white collar salaries necessary to hold the organization together, and price rises in equipment ranging from 3-35 percent. If it were not for the increased output, the company would probably be losing money, Mr. Jahncke said.

The O.P.S. program and its purposes were explained by Walter H. Acheson, director, Building Material Branch, O.P.S. Then the questions began coming. What are the prospects for a tailor-made price regulation for the sand and gravel and ready-mixed industries? This is a pretty broad subject, Mr. Acheson said. The O.P.S. is planning for increased shipping cost allowance. A transportation order has been prepared but higher O.P.S. officials have ruled that further justification is necessary. It has always been the intention of O.P.S. to write a tailor-made regulation, Mr. Acheson reported, in which transportation costs would be included and area adjustments permitted. He mentioned the Johnson earning standard and the difficulty in obtaining data to substantiate price rises because of this standard.

When Mr. Acheson mentioned the long delay necessary in the processing of submitted O.P.S. forms, Mr. Ahearn got up to tell his feelings toward the price control program. Government responsibility should accompany the laws passed to benefit the entire country, he said, that is, the government should set up the machinery to administer the regulations it sets up. Mr. Ahearn then cautioned all producers not to be optimistic about price relief, especially from the Capehart amendment. Still further burdens can be expected. The ready-mixed concrete industry faces a bleak prospect, he continued; it will not be able to pass on the increased cost of transportation and there is no reason to expect this.

Mr. Acheson replied that he was not as pessimistic as that. He thought an industry order would be brought out in the near future. Even though O.P.S. does formulate a policy, it can be overruled, he said, explaining that O.P.S. objected to a freight rate increase but that the Interstate Commerce Commission overruled it. As for the Johnson earning standard, Mr. Acheson said that rate of earnings, not volume of earnings, is the criterion, and that industry earnings rather than individual company earnings are the basis.

A question was asked whether any relief is possible from the higher tax on truck transportation in some states. None is possible now, was the answer, though if the tax is shown separately in billing the customer, any subsequent increase can be imposed on him. The only way to get relief is to remove controls. Mr. Ahearn said the ready-mixed concrete industry is crucified by the burden of costs loaded on it and which producers have had no part in setting up. While waiting for any relief that may come, Mr. Ahearn suggested that the industry might exert pressure on the O.P.S. policy level to change the regulations. This level is subject to political pressure, he said.

Mr. Ahearn felt that it was a mistake to believe there will ever be automatic price adjustments. Rather, there might be a time when producers would be permitted to apply for adjustment. Some relief would be possible under an area method of pricing, he said. In bargaining with labor unions now, he advised producers to do so with the thought in mind that they might bargain themselves out of business. Mr. Ahearn mentioned that in setting maximum prices during the O.P.S. base period, ready-mixed concrete producers received a premium for heating aggregates. Last year at New Orleans, he said, he reported that the maximum base period price (with premium) would apply. This year he said he saw no reason to

change his statement. Many producers would not have survived without this higher price, Mr. Ahearn added.

The Highway Problem

The highway problem and some recommendations for meeting it were advanced by Arthur C. Butler, director, National Highway Users Conference, Inc. The problem of course, is that highways cannot adequately handle the millions of new cars. Coupled with this congestion is little parking space, inadequate road surfaces and accidents. Last year, Mr. Butler reported there were approximately 2,300,000 farm trucks alone, compared to 1,490,300 in 1945. In all, motor vehicle registrations have leaped to more than 52,000,000, while vehicle mileage is up to 500 billion a year.

The solution lies principally in a program described by the speaker as PAR—Project Adequate Roads. This involves "the achievement of a continuous program to meet the needs of our highway systems so laid out to assure priority to the most urgent projects, and to fit a long-range plan. Also, it means joint effort of the highway users and allied industries cooperating with public officials to make certain the needs are met."

Elements of PAR, according to Mr. Butler, are first, continuing highway programming, including a priority program based on sufficiency ratings. Next, classification of our roads according to their traffic service, "essential to efficient administration and to the equitable allocation of cost." The other elements of the program are fair distribution of costs, protection of highway funds to the purpose for which they were collected, and lastly, efficient highway administration.

The sufficiency rating system is the only new point in PAR, Mr. Butler said. It was first used in Arizona in 1946 and has since been widely accepted as an impartial, unbiased method of allocating funds against the most urgent road construction needs. The A.A.S.H.O. recommended the use of sufficiency ratings for the establishment of a 10-year program for federal aid highway systems in all states. At least 12 states use the system, the speaker reported. As many as 20 states are using the system in varying degrees, he added. The Bureau of Public Roads is also using sufficiency ratings to substantiate steel requests to O.P.A.

The sufficiency rating procedure involves the assignment of a value to each road section reflecting its adequacy, based on a critical analysis, by highway department engineers. The road section is rated with respect to its structural condition, traffic service and safety. Generally, each new construction should have an initial rating of 100. The mechanics of rating involve evaluation of each element of the highway in relation to the desirable standard for that element, Mr. Butler said. Some of the elements considered in making the sufficiency rating evaluation are curvature and grades, volume of traffic, width, type and condition of pavement, shoulder width and condition, and adequacy of sight distances along the road.

Each year sufficiency ratings will provide a guide to the establishment of priorities, a basis for continuous programming within the framework of the long-range plan, a means for making annual adjustments to current price trends, and an annual review of financing.

A national PAR committee has been formed to administer the program. Publication of the plan is to be undertaken as soon as possible. One of the most important parts of the plan is the organization of state PAR groups. From these, according to Mr. Butler, most of the action is expected to come. This action is explained in the formal statement of PAR, as set forth by the PAR Interim Committee:

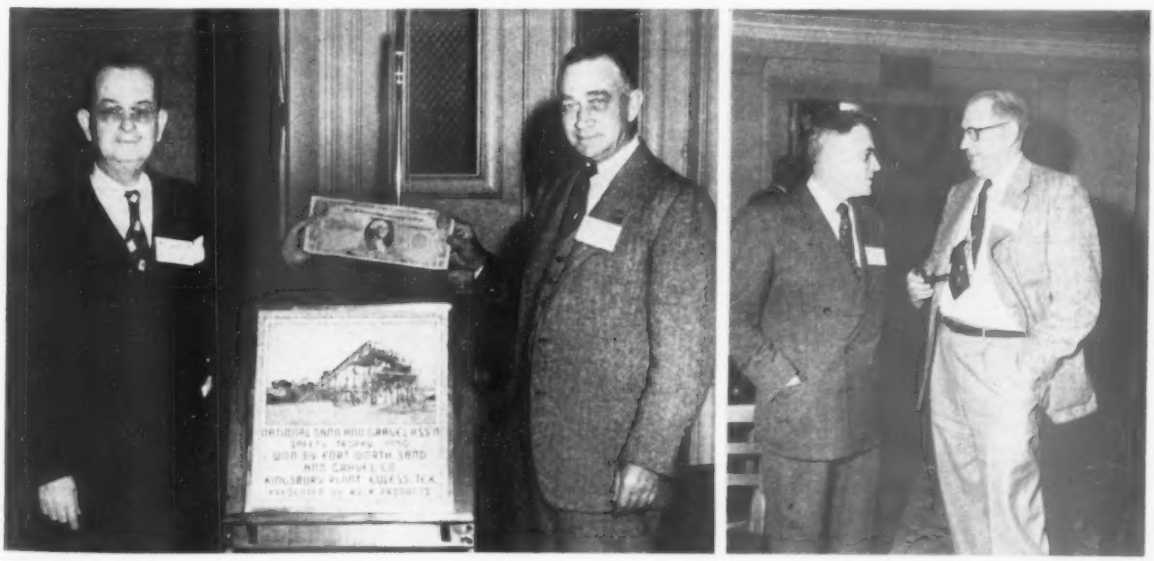
"PAR's immediate and most pressing concern should be to arouse public recognition, and to generate understanding among defense officials that since highway improvement is as indispensable to our defense effort as armaments, power or other primary elements, provision should be made for adequate materials and manpower to do the job."

Highways in Illinois

Frank N. Barker, chief highway engineer, Illinois Division of Highways, outlined the future highway program in Illinois. During 1951 the state awarded construction contracts totalling $45,000,000 on primary and federal-aid secondary roads. The state also had supervision of about $32,500,000 in contracts and day labor work performed by the counties and cities using motor fuel tax funds. During the year the division inspected 4,500,000 tons of aggregates used in the construction program.

In describing the history of highways and automotive transportation, Mr. Barker emphasized the impact the automobile has had upon U. S. economy by pointing out that more than $30 billion has been spent annually in recent years on manufacturing automobiles from raw materials to fin-

(Continued on page 99)



Left: Thomas E. Popplewell, left, Fort Worth Sand and Gravel Co., Fort Worth, Texas, shows he is in the big money as he pays a debt to Frank Carroll, Consolidated Rock Products Co., Los Angeles, Calif. The bet was that Texas producers would win more safety honors than California producers. Right: Two California operators get together, Ed Brovelle, Basalt Rock Co., left, and J. R. Cassidy, Pacific Coast Aggregates, Inc.

Various pieces of equipment have been tested at the mine, some of which may become applicable to the rock products industries. In the left background is the large 1540-c.f.m. portable compressor (16 rubber tired wheels support it). A drill jumbo for vertical holes is in the right background. These two items are in the upper bench of the underground quarry. Trucks and shovels, foreground, also play an important part

LOW COST UNDERGROUND MINING METHOD DEVELOPED FOR BLASTING LARGE TONNAGES

New types of quarry and mine equipment developed at Bureau of Mines oil shale operation at Rifle, Colo. Drilling and blasting research plays important role

By WALTER B. LENHART

SINCE 1944 THE United States Bureau of Mines has been carrying on extensive test and experimental work at Rifle, Colo., for the purpose of developing a low cost underground mining method for handling great tonnages of oil shale. Oil shale is classed as a dolomitic marlstone containing oil; in its physical properties it resembles limestone, having about the same hardness, toughness and other physical characteristics. However, it is somewhat more abrasive than limestone.

During the past few years a continuous method of retorting oil from the shales has been evolved, and this has given greater impetus to the entire program. The mine at Rifle is located about 2200 ft. above the experimental retorting plant and a 5½-mile road connects the two. Both are in sight of each other and when viewed from the highway the work of man is dwarfed by the massive bluffs that form the escarpment of the Colorado river.

The information following is an accumulation resulting from two trips to Rifle. The first was in July, 1947, and the second late in 1951. A considerable portion of the technical data was supplied the author by the Bureau of Mines staff at Rifle and from additional Bureau of Mines data that are appended as a bibliography. The information is essentially a resumé of the work done at the experimental underground mine.

Test mine production runs have been made involving sufficiently large tonnages and enough time duration to arrive at cost estimates. Because of the low oil content of the shales large daily tonnages have to be mined. In the more recent work it has been estimated that a daily tonnage of 19,200 tons for two shifts is about the minimum for a commercial plant that can compete with other resources of oil. This tonnage of ore will yield an estimated 11,700 bbl. of oil.

After the oil is removed from the shale a debris disposal problem could arise as for every ton of shale treated, practically a ton of refuse must be disposed of. However, any commercial plant will probably be built on one of the higher "hog backs" at elevations just below the mine portals so gravity disposal by belt conveyors and possibly a stacker boom will be the method. The clinker is not suited for manufacture of portland cement mainly because of its high magnesium content.

Cost Details

In 1949 engineers made estimates based on a daily tonnage of 14,035 tons of rock. In 1950 the figures were revised and based on 19,700 t.p.d. which showed direct costs of 29 cents per ton for mining, conveying and crushing. The total cost to the surge pile ahead of the retorts was given as 42.6 cents per ton; this included management, depreciation, taxes and insurance but did not include depletion, interest on investment, profit, and expenditures for off-site facilities. The capital investment was upped from $4,200,000 to $4,750,000.

Details of the 1949 estimates are in Table I. While not quite as low a total cost is shown compared to the 1950 (total) estimates, the figures show the general trend.

To arrive at the cost figures given, almost 300,000 tons of rock have been mined to date, of which 58,500 tons were mined in 1950. In the mining operation it is planned to use the following crew per shift: one shifter; two drillers; two scalers; two blasters;

Table I. Summary of operating costs for producing 14,035 tons of crushed oil shale daily

Operation	Cost/ton	
Mining:		
Direct supervision	$0.0171	
Drilling	.0475	
Blasting	.0848	
Loading	.0328	.3029
Transportation	.0658	
Scaling	.0155	
Electric distribution	.0232	
Miscellaneous	.0162	
Crushing and conveying:		
Direct supervision	.0020	
Crushing	.0322	.0431
Conveying	.0089	
Overhead:		
Supervision, engineering, management	.0461	
Labor burden	.0339	
Depreciation	.1105	.2075
Taxes	.0088	
Insurance	.0082	
Subtotal	0.5535	
Contingencies	.0324	
Total cost	0.5859	

one shovel operator; one tractor skinner; three truck drivers; and one maintenance, compressor and drill mechanic for a total of 13 men.

These men will mine 1800 tons per shift or 138 tons per man-shift. This involves drilling, loading drilled holes, blasting, and transportation of one heading-round. Moving time of the shovel is an importnt cost item at Rifle.

The crew for the bench mining will comprise 11 men and are listed substantially as above, except on the benches where two men will do the scaling and blasting. The benches will produce 2200 tons per shift or 200 tons per man-shift. On the benches, heavy drifters are mounted vertically (or nearly so) on a tractor-jumbo that will be detailed later. The holes are drilled on 8-ft. spacings, and 6-ft. 8-in. burdens. Later the bench drills may be mounted on rubber tires. On these 23-ft. benches the holes start at 2 in. and bottom at 1⅞ in. with 14 ft. and 24 ft. lengths of steel used. Ingersoll-Rand Carset bits are used which last 2000 ft. per bit. Drill rods are regular hollow carbon steel, 1¼ in. in diameter and in 16 ft. lengths. Much of the work in 1950 related to improvements in drilling and blasting and these studies resulted in a saving of one cent per ton over previous years' work. On the benches, free running du Pont EL 427 blasting powder is used along with three or four priming sticks of 45 percent Gelex. The powder requirements were 0.33 lb. per ton. Powder consumption on the headers was 0.47 lb. per ton using 45 percent No. 2 Gelex.

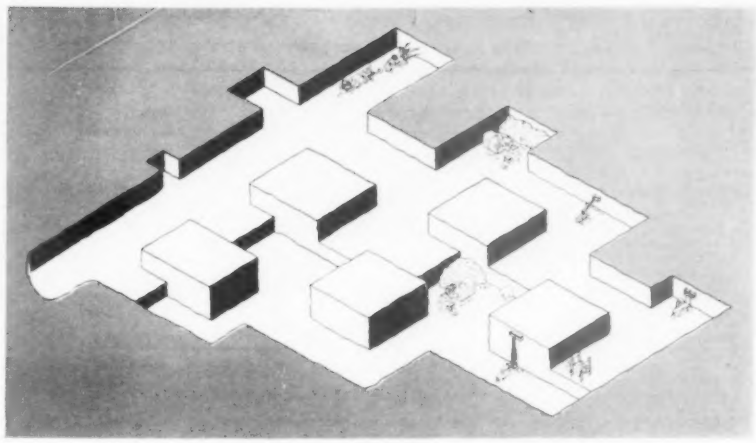


Fig. 1: Layout of underground experimental mine

Three test runs were made in 1949 on the header level. The third of these tests involved the actual breaking of 1628 tons per shift with an average output of 148.2 tons per underground man-shift. Table II gives a summary of Test No. 3 along with the cost of the various items, including labor.

Oil for the Future

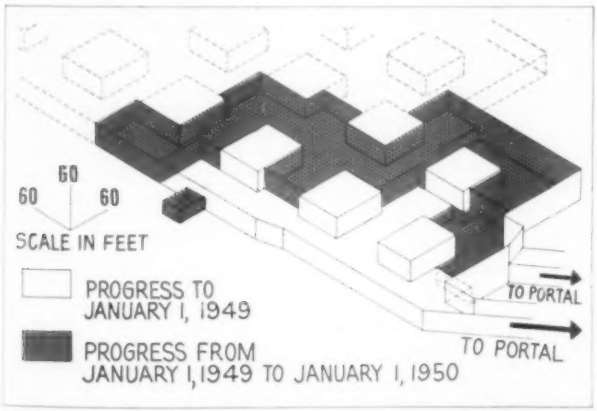
Recently, details of the proposed 19,200 t.p.d. plant were being worked out on the drawing board for estimating purposes, as this appears to be an optimum size unit of an oil shale mine.

At the time of our second inspection, representatives of independent oil producers were vitally interested in the program and possibly the next step will be the actual construction by independents of a large capacity plant or plants. The 19,200 t.p.d. plant could be classed as a pilot plant. The mine site for this program would cover 1.4 sq. miles and would supply the plant for an estimated 20 years. Plans are projected for operations to handle 250,000 t.p.d. of rock. Oil produced from such a plant would only represent 5 percent of our annual consumption.

The oil shales include vast areas that cover portions of the states of Utah, Colorado and Wyoming. It is estimated that more than 300,000,000 bbl. of oil could be recovered from a 500 ft. thick band in northwestern Colorado. Only about 64 percent of the oil content of the rock in place is regarded as recoverable; 25 percent is left as pillars and about 5 percent may be lost as fines in crushing and screening. The lower portion of this 500 ft. thick measure is a band some 70 ft. thick that is much richer in oil; this bed, referred to as the Mahogany ledge, is the one that will be exploited first. It is estimated that at least 80 billion bbl. of oil can be recovered from the Mahogany ledge. So if the nation's needs should require it, the oil shale industry could become the largest quarry operation in the world.

Underground Mining

We refer to these underground mining operations as underground quarries for they resemble an open pit quarry more than they do a con-



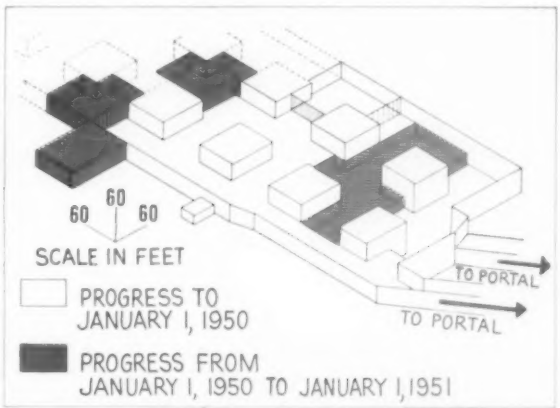


Fig. 2 (left): Isometric drawing of underground quarry using a header level and two bench levels. Fig. 3 (right): Isometric drawing of underground quarry using header level and single bench system of mining

Table II. Summary of costs, Test Run 3*

	Labor		Supplies					
	Operating	Maintenance	Power	Fuel	Explosives	Bits and drill rod	Other	Total
Drilling†	$0.018	$0.004	$0.004	$0.001	—	$0.020	—	$0.047
Blasting†	.010	—	—	—	0.072	—	0.002	.084
Loading‡	.018	.014	.003	.002	—	—	—	.037
Transportation‡	.023	.024	—	.004	—	—	—	.051
Scaling	.017	.001	—	—	—	—	—	.018
Direct supervision and engineering	.013	—	—	—	—	—	—	.013
Electrical distribution	—	—	—	—	—	—	.016	.016
Miscellaneous	.001	—	.002	—	—	—	.004	.007
Labor burden§	—	—	—	—	—	—	.019	.019
Total direct cost	.100	.043	.009	.007	.072	.020	0.41	.292

*Summary is based on four-week operation, two weeks on top level and two weeks on bench level of the mine.
†Maintenance costs on these units are based upon the cost of operating them at the oil shale mine for one year.
‡Maintenance costs on these units are based upon the per-hour cost of maintenance parts and maintenance labor as supplied by the manufacturers of the units.
§Labor burden figure is based on actual operating and maintenance labor charged during the test run. Disposition is based on 260 working days:

	Percent
a. Annual leave	10.1
b. Holidays (8 days with pay)	3.1
c. Sick leave	4.0
	17.1

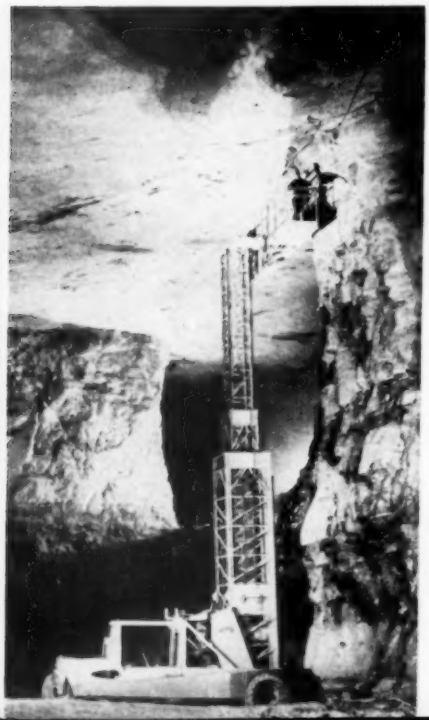
Labor		Supplies		
Classification	Rate per hour	Item	Unit	Amount
Miner	$1.50	Drill rods, 16 ft. x 1¼ in.	Each	$12.18
Shovel operator	1.60	Bits, carbide insert	Each	16.50
Bulldozer operator	1.50	Dynamite, 1¾ x 8 in., 45 percent	Lb.	0.165
Truck driver	1.50	Electrical detonators	Each	0.22
Maintenance men	1.55	Diesel fuel	Gal.	0.165
Shift foreman	1.75	Electric power	Kw.-hr.	0.012
		Truck tires	Each	187.45

ventional mine (Fig. 1). The beds of dolomitic marlstone are almost horizontal and the room-and-pillar system of rock extraction is practiced but the big difference at Rifle was the use of a header and a two-bench system of mining (Fig. 2), which was later changed over to a 39-ft. header and a single 34-ft. bench (Fig. 3). The principal advantage of the latter setup is that shale of uniform grade will be supplied to the processing plant at all times. The richness of the shale varies from one shale bed or stratum to another and the average richness of the top 39 ft. is the same as the 34 ft. on the bottom, whereas, in the three-level operation, the top level would be lean, the middle level rich, and the bottom level medium.

Under the header and two-bench system the header is drilled and blasted following somewhat conventional room-and-pillar mining, and the lower benches are drilled with vertical jumbo-mounted 4-in. air drills. Blasted rock is loaded with a 3-cu. yd. Bucyrus-Erie 54-B shovel and the rock hauled to the crushing plant in 15-ton, rear-dump Euclid trucks. A Caterpillar with dozer blade is used for cleanup work around the shovel. The underground work was strongly influenced by observations made at some of the underground limestone mines.

The oil shale mine was developed by driving advance headings 27 ft. high and 60 ft. wide directly under a roofstone at the top of the Mahogany ledge. Pillars, 60 ft. square and staggered in one direction, are used. The advance of the top level is followed by two 23-ft. benches which are mined similar to quarry benches.

The decision to drive underground openings 60 ft. wide, leaving 60-ft. square pillars for the support of the overburden, and the selection, design, and fabrication of mechanized equipment are the results of more than three years of exhaustive research.



A 65-ft. telescoping scaling rig developed for use in the mine. The platform has controls on it for raising or lowering. Minimum operating height of the scaler is 21 ft. with a traveling height of 15 ft. 10 in. The telescopic mast can be tilted forward 10 deg. and backward 5 deg.

Before making the final decision as to the mine layout, theoretical studies of the strength and character of the oil shale rock and the size and shape of pillars and openings of the underground mine structure were made in the Barodynamics Laboratory of Columbia University and at the Bureau of Mines Applied Physics Laboratory, College Park, Md. Practical studies to check the theoretical calculations were made at the oil shale mine in a test room excavated directly under the selected roofstone.

Experimental underground work at Rifle during the past year was confined to the "selective mine," and the "underground quarry." The activities in the selective mine were confined mostly to test room research to determine how big a room could be made without endangering the workings, and similar basic information.

Selective Mine

Early in December of 1946 a test room 50 ft. wide and 100 ft. long was excavated immediately under the roofstone (Fig. 4). The procedure since then has been to widen this room by increments of 10 ft. while making observations of the behavior with special instruments. The test room was widened from 50 to 60 ft., then to 70 ft. in 1947, and to 80 ft. in 1948. Aside from minor hairline cracks and air slacking, no failures occurred.

After the test room was widened to 80 ft., it was lengthened to 200 ft. After standing for several weeks, a slab from the roof of the 200- x 80-ft. room fell and it was concluded that the 60-ft. rooms in the underground quarry have an adequate factor of safety but that rooms 80 ft. wide would not be safe.

One accepted method of predicting imminent failure in underground mine openings is by listening to the ground "work," that is, make audible popping and cracking noises. These noises are caused by failure of rock crystals and actual cracking of the rock formation when stressed beyond the breaking strength. The intensity and frequency of these noises offer a semiquantitative method of predicting excessive stresses in underground mine structures. It was reasoned that if these noises could be detected, while still in the subaudible range, the maximum safe roof span could be determined.

Seismic equipment was adapted to detect and record these subaudible noises caused from cracking or rearrangement of minute rock crystals subjected to pressure.

From a study of these data it has been possible to establish a definite noise level (number of noises per hr.) pattern that gives a qualitative indication of the stress conditions in the

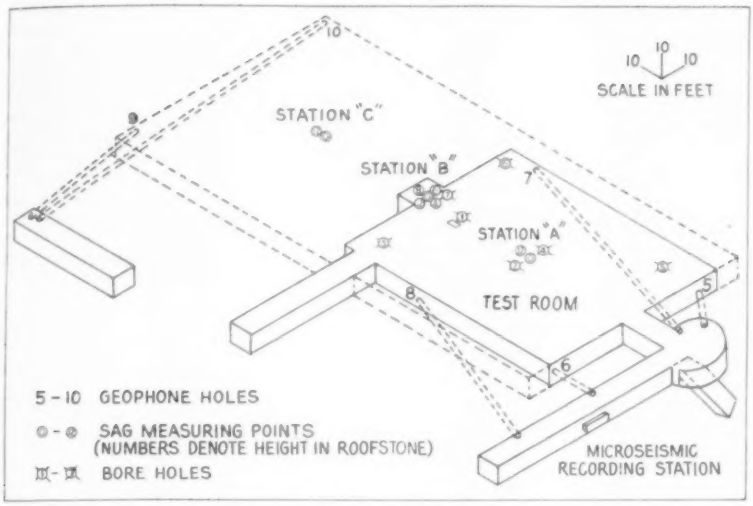


Fig. 4: Isometric drawing of test room showing recording installations

test room roofstone. The average normal noise level is less than five noises per hr.

Immediately after blasting in the test room or its vicinity, and for a short period after each widening, the noise level has been as high as several hundred noises per hr. In all cases, so far, the noise level has dropped to the normal level within a few days. If the noise level should suddenly start increasing, or if it should fail to return to the normal level after blasting or widening, it is to be assumed that the elastic limit of the rock is being approached.

Test room studies included measuring roof subsidence and correlating the subsidence rate with the seismic noise level and other stress data that could be developed.

The first subsidence station was installed to measure the sag in the immediate roofstone at the center of the room. Stainless steel studs were cemented into the roof and floor at the center of the room. Measurements are taken between these two points with a stainless steel extensometer, equipped with an Ames dial on one end and a thermometer for making temperature corrections. Measurements taken with this instrument are accurate to 0.001 in. As the test room was widened, it developed that two factors were affecting the sag. One was due to the width of the opening, in which case the sag was immediate and relatively large. The other was due to plastic flow.

The greatest sag rate (0.13 in.) occurred when the room was widened from 60 to 70 ft. After widening, the rate of sag decreased rapidly and stayed at a slow rate for several months, gradually decreasing with time and finally approaching zero. The total sag after widening from 70 to 80 ft. was only 0.10 in.

In addition to the seismic and subsidence information, it was desirable to determine the absolute pressures in the mine structure. A method was devised for obtaining these measurements based on the theory of calculating the stress by the relief of strain.

The procedure followed was to select a site relatively free from blasting fractures. A surface about 4 x 5 in. was sanded flat and smooth. An electric strain gauge of the Baldwin SR-4 type was bonded to the surface and a zero reading obtained with a strain indicator. Using a specially designed diamond saw, and with the gauge in place, a prism section about 3 x 4 in. to a side was sawed out, containing the gauge. A reading of the strain relief was then obtained. In the laboratory, the moduli of elasticity are determined from the sawed-out specimen. From the moduli of elasticity and the strain relief the original stresses in the specimen can be calculated.

A number of strain measurements were made in the oil shale mine. Two types of measurements were made—one where the site tested was under compression and the other where the site was under tension. All tension tests have proved unsuccessful, owing mostly to the fact that tension was relieved by tiny cracks in the specimen. Compression tests, however, have yielded encouraging results. Many of the measured pressures obtained came within 10 to 15 percent of theoretically calculated values.

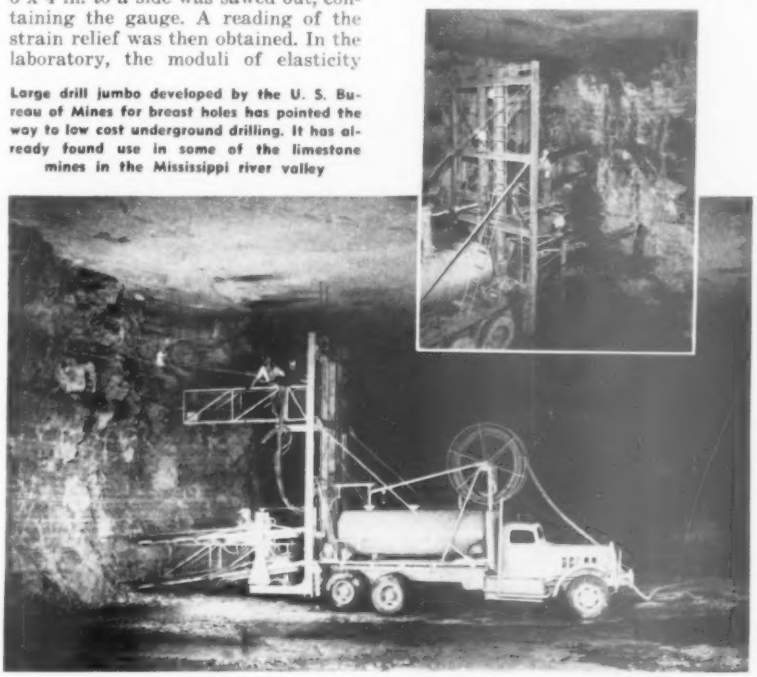
As a direct result of information obtained from roof studies and mine-structure stress analysis, openings in the experimental mine have been increased from 50 to 60 ft. wide, leaving 60-ft. square pillars to support the overburden.

Instruments developed for measuring mine-structure stresses will be installed in the experimental mine to determine the roofstone behavior and the increase of pressure on the supporting pillars as the mine openings are advanced.

The equipment and procedures for roofstone studies and mine-structure stress analysis, developed by the Bureau of Mines, should find wide application throughout the rock products industry in predicting safe mine-structure design.

Drill Jumbos

At Rifle two types of drill jumbos have been developed, one for drilling



Large drill jumbo developed by the U. S. Bureau of Mines for breast holes has pointed the way to low cost underground drilling. It has already found use in some of the limestone mines in the Mississippi river valley

breast holes and the other for bench holes. The latter uses an RD-8 Caterpillar tractor with drill bars mounted horizontally front and back and on both sides. Four of the 15-ft. drills can be mounted on the assembly and two men operate the four drills. We have seen similar types of drill jumbos particularly on highway construction work and more recently in a limestone quarry in Oklahoma. For quarries using wagon-type drills the jumbo in use at Rifle can be studied with interest.

The jumbo used for drilling the breast holes is more pretentious. In our travels we have seen quite a few different types of drill jumbos in use but in most cases they were a homemade rig and often of questionable design and utility. The Rifle drill jumbo is a well engineered and well built piece of rugged equipment. The machine was made by Winter-Weiss Co., and at 1950 prices cost $21,000 without the 10-ton truck.

The jumbo has two platforms, each carrying two long feed percussion drills. When carrying four Gardner-Denver D-99, 4-in. drills at 90 p.s.i. pressure they can drill at the rate of 20 in. per minute in this dolomitic marlstone or oil shale. Before using the jumbo it took eight man-shifts to drill 72, 15-ft. holes in a 60-ft. heading 27 ft. high. Now two men do the job in six hr.; 500 ft. of 2-in. hole per man-shift is average. Two men operate the four drills.

It has been found that a V-cut is best for the dolomitic marlstone with 72 holes per round. There are 12 V-cuts at the center and the 60 holes surrounding the cut-holes are delayed (Fig. 5). The pratice is to use a 6-ft. horizontal burden and a

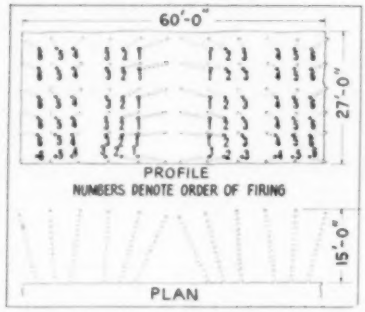


Fig. 5: A 72-hole round using single V-cut as used in the Rifle, Colo., experimental mine

5-ft. 3-in. vertical burden. A 20-ft. guide scale is mounted on one of the vertical guide-ways of the jumbo to aid in spacing the holes properly.

Three of these drill jumbos are said to be in operation in one limestone mine in the Mississippi river valley and one in a fourth limestone mine in the same general area.

In earlier work it was found that standard detachable steel bits lost gauge at 5 ft., though some work has been done toward hard surfacing these bits with acetylene-tube borium, thereby increasing the life to 70 ft. However, Ingersoll-Rand Carset tungsten-carbide bits are used exclusively in the underground quarry operations. Several types are on the market, and an experiment is being conducted to determine which is most suitable for drilling at Rifle. One bit under test has drilled in excess of 1.5 miles of bore-hole and is still in service.

Significant data on the effects of rotational speed and amount of thrust required are being obtained. For best drilling life, low rotational speed at high thrust is most effective. However, for highest drilling rates, high rotational speed and high thrust are necessary. Increasing rotational speed at a given value of thrust increases the rate of penetration but decreases bit life. The harder grades of tungsten carbide have the greatest resistance to wear, but they have lower compressive strength and often fail by chipping, usually at the center.

During a four-week period in 1949, 40 man-shifts of drilling labor were required to drill 21,205 ft. of hole and break 29,835 tons of shale.

Rounds drilled	20
Tons broken	29,835
Holes drilled	1440
Footage drilled	21,205
Bits used	12
Number drill rods broken (16-ft. rods)	40
Average footage per drill rod	530
Average footage per bit	1766
Power for compressed air, in kw.-hr.	15,684
Underground drilling labor, man-shifts	40
Total drilling labor, man-shifts*	67

To drill a 60 ft. wide heading, four set-ups are required as the drill jumbo platform is 8 x 14 ft. Small scale models of a newer type of jumbo are at Rifle and in this model the framework holding the drills folds in such a manner that the working section of the jumbo will be nearer 30 ft. wide so that the 60-ft. room can be drilled out in two set-ups. This is only one example of the constantly changing mining program at Rifle, all of which will eventually benefit many rock products operators.

Percussion Drilling Research

Much of the early research work at Rifle was directed toward solution of problems associated with percussion drilling. One of the major expense items in percussion drilling has been the cost of drill rods. All production drilling at the oil shale mine is now done with regular carbon drill rods and tungsten carbide bits. The Bureau of Mines, however, has been testing various alloy rods in an effort to find a more economical drill rod. Arrangements were made with the Crucible Steel Co. to obtain several pieces of Crusca carbon, Alva, Park A, and CA alloy drill rods. All rods were 1¼-in., hollow-round, Leyner-lugged, in 16-ft. drilling lengths.

An experiment was conducted to determine the drilling life and energy-transmission characteristics of the four types of alloy rods under controlled conditions. Test drilling was done with the heading jumbo. The average number of blows delivered per minute by the drilling machines was indicated by a Frahm resonant reed tachometer as a check on the mechanical condition of the machine. Air pressure was continuously recorded by a Foxboro pressure recorder and averaged from 92-96 p.s.i.g. Water pressure was equal to air pressure. Ingersoll-Rand Carset bits in a 2-in. gauge

Drill jumbo developed for drilling bench holes is mounted on a track-type tractor

*Includes all operational labor for supplying compressed air and water for drilling and maintenance labor to all drilling equipment.

Boom scaler works on the pantograph principle and is self leveling

Scaler for lower working heads is used mainly for loading breast holes

Table III. Summary of drill rod test data

Type of rod tested	No. of rods tested	Ave. drilling life, ft.	Ave. drilling rate, in./min.	Ave. base cost per ft. of hole drilled, cents
Crusca carbon	5	822.1	19.3	1.29
Alva alloy	4*	630.0	26.7	1.83
Park "A" alloy	5	532.1	26.4	2.34
Crusca "CA" alloy	2	520.5	26.3	2.39
Crusca "CA" alloy	3†	1271.3	24.5	0.98

*Rod 2 in this group was stuck in drill hole at 164 ft. and was not considered in test average.
†These rods were drawn at 525 deg. F. in addition to heat treatment given the other two "CA" rods.

were used throughout the test. These bits were kept sharp at all times.

Table III summarizes the drilling data obtained using the various grades of drill rods. The cost per foot of hole drilled with each type of drill rod also is shown. The cost was computed on the base cost per lb. of drill rod only.

A tremendous improvement in drill rod life was obtained over the average life determined from previous tests. This improvement is accredited to modifications of the heat treatment procedure. The average life of Crusca carbon rods, for example, was firmly established at about 530 ft. of drilling before this test. Data taken over a period of several years on nearly 100 drill rods had indicated that the figure of 530 ft. was the maximum average drill life that could be obtained with high-carbon rods in drilling the dolomitic oil shale. In addition, the data had shown that, in the past, roughly 75 percent of the rods used had broken in or near the lugs and 13 percent had broken near the threads. This high incidence of failure near the ends of the rods pointed to faulty heat treatment.

The high-carbon rods used in this latest test averaged 822 ft. of drilling. Failure of the rods occurred in the body of the rods rather than at the ends and resulted in a marked improvement in the drilling life. The drilling life of Park A, Alva and CA alloy rods determined in this test also was greater than in previous tests. With these rods, however, some of the failures still occurred at the ends of the rods indicating that further modifications of heat treatment procedures for alloy rods might result in greater drilling life.

Of the four types of alloy rods tested, the CA alloy rods seemed most suited for drilling dolomitic shale. These rods gave the greatest drilling life, the least cost per ft. of hole, and have good energy-transmission characteristics.

Perhaps the most interesting single feature of this investigation is the difference in drilling rates achieved with the different alloy rods. Table III shows that Alva, Park A, and CA alloy rods all gave drilling rates of from 5 to 7 in. per min. faster than those attained with Crusca carbon rods. The staff at Rifle is convinced that the conditions of this test were such that these data present a factual picture and that the differences in drilling rates are not due to uncontrolled variations in the experiment. Beyond this, the operators cannot as yet explain the reasons for faster rates of penetration. Investigations of the physical properties of the four alloys are now being undertaken in an attempt to account for this phenomena.

Rotary Drilling Research

Late in 1948 at Rifle the staff began testing various types of coal augers as a means of drilling blast holes in oil shale. Unfortunately these drills performed poorly in the much harder oil shale formation. The conventional steel bits had to be replaced with tungsten carbide tipped bits before it was possible to drill the shale, and the coal drills constructed to operate at fixed rotational speeds and feed rates were totally unsuited for drilling in hard rock. Although the results of these early investigations were almost entirely negative, a few of the tests indicated the feasibility of drilling blast holes in oil shale by rotary methods using tungsten carbide tipped auger bits. The real difficulty appeared to be in the development of suitable bits and a suitable drill machine

with independent control of rotational speed and drill thrust.

In 1949 the oil shale staff undertook the design of a test model rotary drill which would provide a broad range of operating conditions. The rotational speed of the drill motor can be controlled between zero and 1050 r.p.m. A maximum of 4000 lb. of thrust to the drill motor is possible. The drilling unit is capable of developing 2100 in.-lb. of torque but can be set at any desired value of maximum torque below the 2100 in.-lb. limit.

The unit is designed for drilling with water to remove cuttings from the drill holes. Standard EX diamond drill rods are used with the machine and a variety of tungsten carbide tipped bits are being tried.

Enough operating and bit testing data have been gathered during the last year to show that rotary drilling would be more economical than percussion drilling for the bench level of an oil shale mine. It is estimated that in a commercial mine, bit and drill rod costs for the rotary method would be about a cent a foot as compared with almost three times that amount for percussion drilling.

To date, developing a bit with the desired characteristics has been the principal objective of the experimental rotary drilling program. Earlier tests showed that the hardest grade tungsten carbide inserts were the most abrasion resistant but were subject to failure by compression in the central portion of the bit. Softer grades resisted failure by compression but yielded poor bit life because of their low abrasion resistance. A bit combining the abrasion resistance of harder grade inserts and compression strength of softer grade inserts was designed by Tool Specialty Co. and is said to be the most successful type of bit tested to date.

Both horizontal and vertical 2-in. blast holes are being drilled with the rotary drill at rates of over 100 in. per min. The fact that rates of penetration of this magnitude have been achieved in drilling oil shale is interesting. Oil shale is actually a magnesium marlstone and is somewhat harder and more abrasive than limestone. It is planned to test the rotary drill in limestone in the near future. The potential value of this research to the limestone industry is obvious.

Blasting Research

The Oil Shale Mine Branch now is engaged in a cooperative research program with the Applied Physics Branch of the Bureau of Mines' Eastern Experiment Station. The purpose of this program is to compare the effect of explosive shots in the rocks at Rifle as the type of explosive or the method used in loading, stemming, or firing the explosive is varied. A strain gauge and recording

An industrial gun, mounted on a surplus bomb trailer, has been used experimentally as a supplemental scaling tool

equipment are employed in these tests to measure the dynamic strains developed in rock at various distances from a nearby explosion. The effect of different types of explosives and other factors on the intensity of dynamic strains produced in oil shale is being measured.

Briefly, this technique employs resistance-wire strain gauges bonded to a piece of core. These assemblies of gauge and core are oriented and cemented into diamond drill holes at varying distances from a blast hole in which a charge is to be detonated. When the charge is detonated a dynamic strain wave passes through the rock and deforms the gauges in an amount related to the intensity of the wave and the distance between the gauge and the charge. The output from each gauge is passed through a pre-amplifier to an oscilliscope. The oscilloscope image is recorded by means of a drum camera on a moving film. By this method the intensity of the dynamic strain produced in a given rock at fixed distances from explosive charges of different types loaded in various manners can be compared accurately.

New Mining Equipment

The other pieces of mechanical equipment used at Rifle, and which

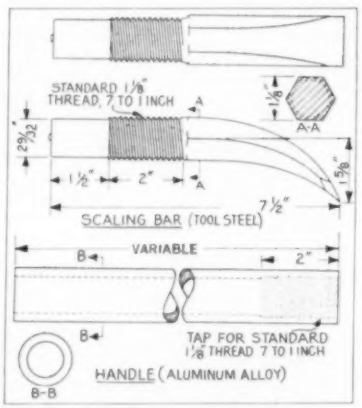


Fig. 6: Lightweight scaling bars in use at the oil shale mine

are briefly described here, were developed cooperatively by the various machinery manufacturers and the staff of the Bureau of Mines. In most cases, approximate costs are given, all based on 1950 levels.

To get low mining costs, the Bureau of Mines has developed a 1540 c.f.m. portable, rubber-tired, air compressor. It is also used as a utility station. The compressor carries a 2500-gal. water tank and a 200-cu. ft. air receiver. The former can supply water to the drills and is designed to stand pressures up to 150 p.s.i. Mounted on a 30-ton trailer are two Joy type "Y" double-acting, model B, class WN-102, size 14- 8 x 7 compressors, each driven by a 150-hp. squirrel cage motor. The trailer is 30 ft. long and 12 ft. wide and has 16 tires, eight steering dollys at each end, and is provided with hand brakes. The trailer cable is a 5000-volt unit and contains three No. 4 flexible conductors and three ground wires. General Electric 5000-volt coupling plugs are used. The compressor cost approximately $45,000 and was made by Winter-Weiss Co.

On one test the temperature of the air from the unit was 170 deg. F. at full load. When idling the temperature was 100 with ambient air of 40 deg. F. By moving the compressor close to the face there was an increase in efficiency of 12 percent when using the air at the higher temperature. The compressor will supply four heavy drifters that are normally used on the jumbo. Prior to using the compressor, drilling required 0.531 kw.-hr. per ton of shale but this has been reduced to 0.421. One of these units is said to be going into use in a large limestone mine in Ohio.

Three different types of scalers are in use at Rifle for dislodging rock from the backs and other higher places in the mine. A 65-ft. telescopic scaling rig has been developed. This is a rubber-tired, three-wheeled Wagnermobile. The platform has controls on it for raising or lowering. The minimum operating height of the scaler is 21 ft. with a traveling height of 15 ft. 10 in. The telescopic mast can be tilted forward 10 deg. and backward 5 deg. It is powered by a 6-cyl. Hercules diesel engine. This unit cost about $12,500.

The second type of scaler for lower working heads is similarly mounted on a three-wheeled, rubber-tired Wagnermobile. It resembles a more conventional fork lift truck. It has a maximum working height of 27 ft. and a traveling height of 12 ft. 6 in. Width of the platform, which will support a 1000-lb. load, is 96 in. Its main use at Rifle is for loading breast holes in the headings and for that reason some have referred to it as a "powder loading machine." It cost $8500.

The third type is the boom scaler. This uses a Superior revolving crane mounted on a TD-9 International

tractor. The boom works on the pantograph principle and is self leveling. It has a swing of 275 deg. and can reach to a maximum height of 27 ft. With the boom flat the minimum clearance is 12 ft. The platform is not remote controlled. A stoper or even a drifter can be mounted on the platform so that plug holes can be readily drilled from it. The machine has the advantage over the other types in that it is more rugged, has a higher floor clearance, and the running gears are not so apt to be damaged from falling rock. It cost about $7500.

Common practice in many metal mines is the use of solid steel bars for scaling. Present trend of the industry is to adopt magnesium and aluminum alloy tubing for scaling bars.

Because scalers use the bars for an entire 8-hr. shift, light weight is of primary importance. As shown in Fig. 6, the design of bars in use at the experimental mine is simple. The steel tip is made of 1¼-in. high-carbon tool steel fabricated as follows. The shank end of the steel tip is turned and threaded on a lathe; the tip is forged and then air-cooled; about 2½ in. of the forged tip is reheated to a temperature just below dull-red heat and quenched in water to harden. The purpose of the slight bend in the tip is to provide a fulcrum near the working end.

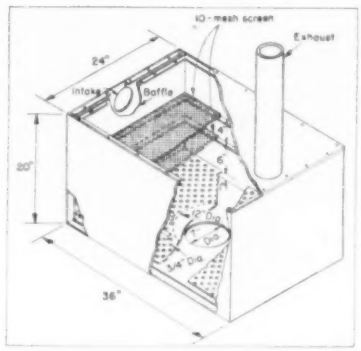


Fig. 7: Isometric projection of diesel exhaust-gas scrubber for trucks in the mine

At the present time, handles are made from a 1-in. standard 61ST aluminum tubing. The tubing is 1-in. I.D. and has a wall thickness of 0.133 in. The point at which failure occurs most frequently is the base of the threads in the aluminum section. A possible way to overcome this trouble would be to use a shrink fit or a resin-type cement or rivets to hold the tip in place. Scaling bars are fabricated at an approximate cost of $3 a bar.

Experiments have been carried out with an industrial gun as an additional scaling tool. The gun used is a Remington industrial model assembled on a bomb trailer mount. The gun weighs 92 lb. and shoots a 3-oz. lead projectile that is about equivalent in size to an 8-gauge shot gun. The gun develops a muzzle velocity of 1600 ft. per sec. and has muzzle energy equivalent to 3½ ft.-tons. At the yards indicated in the following tabulation the energy developed is given:

Yards	Ft.-lb.
50	5684
100	4387
150	3584
200	2987

The gun has been found quite useful for shooting down large icicles; however, it has not been too successful for dislodging rock from the brows.

Gas Filter

The Bureau of Mines has demonstrated that much of the aldehyde content of diesel-engine exhaust gas can be removed by passing the gases through an aqueous solution of sodium sulfite and hydroquinone. The principal disadvantage of the early scrubbers was loss of scrubbing solution by mechanical entrainment in the exhaust-gas stream. Fig. 7 is a drawing of the most satisfactory scrubbing unit yet developed at Rifle. The scrubber tank is filled to a depth of 6 in. with a solution of 15 gal. of water, 15 lb. of sodium sulfite, and ¾ lb. of hy-

(Continued on page 107)

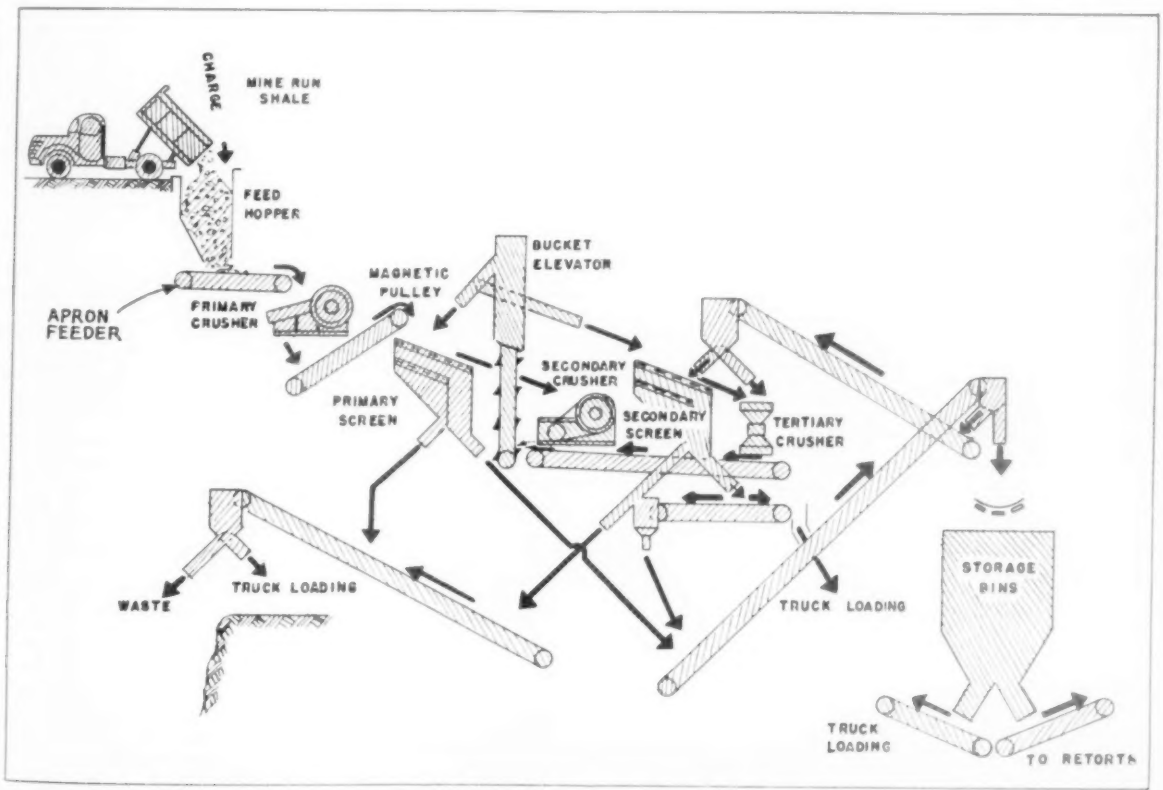


Fig. 8: Flow diagram of experimental crushing plant

Kiln Performance Charted from Studies of Gas Analysis

By WARREN H. WEISZ*

TO USE THE MASTER KILN thermal performance chart, kiln exhaust gas analysis, as well as fuel and stone analysis, needs to be considered. The whole is based on the volume percentage of CO_2 present in the kiln exhaust gases in excess of that normally obtained when its only source is from the fuel alone and there is no $CaCO_3$ or $MgCO_3$ dissociation. The fuel must be considered since coke combustion, for example, will give more CO_2 than hydrogen-containing fuels.

The stone must be considered because magnesite will give off more CO_2 than calcite, and because the ratio of $CaCO_3$ to $MgCO_3$ varies in different stones. Kiln feed may, on the one hand, be 99 percent carbonate ranging down to, in the case of portland cement, only about 77 percent carbonates on the dry basis.

In addition combustion must be considered. The gases may be diluted with excess air resulting in less CO_2 and the presence of O_2; or there may be incomplete combustion, again lowering CO_2, and presence of CO. There also may be a combination of incomplete combustion and excess air dilution.

In the sequence it is necessary first to determine the "equivalent CO_2." This is the quantity of CO_2 that would be found if combustion were complete and if there were no excess air present in the exhaust gas at the production rate and efficiency at which the kiln was operating when the analysis was made. An increase in equivalent CO_2 indicates an increase in efficiency and also can indicate an increase in quality of product containing less core. Ordinarily the following simple calculation is all that is necessary where the analysis determines only CO_2, O_2 and CO.

$$\text{Equivalent } CO_2 = \frac{100\ (\%\ CO_2 + \%\ CO)}{100 - 4.78\ (\%\ O_2 - \frac{\%\ CO}{2}) - \frac{\%\ CO}{2}}$$

For example, assuming that kiln gas analysis would be $CO_2 = 25$ percent; $O_2 = 5$ percent and $CO = 2$ percent, the calculation carried out would give:

$$\frac{100\ (25 + 2)}{100 - 4.78\ (5 - \frac{2}{2}) - \frac{2}{2}} = 33.8\%\ \text{equivalent } CO_2$$

If there are other combustible gases present and determined in the kiln exhaust and if extreme accuracy is desired in determining the equivalent CO_2, the following equation should be used:

$$\text{Equivalent } CO_2 = \frac{100\ (CO_2 + CO + CH_4 + 2C_2H_6)}{100 - 4.78\ (O_2 - 1/2CO - 1/2H_2 - 2CH_4 - 7/2\ C_2H_6) - 1/2\ CO - 3/2H_2 - 2CH_4 - 5/2C_2H_6}$$

The second factor to be determined is "A" which takes account of stone quality and lime burn. For accurate work one may use the following equation with the values taken from the general average lime analysis (percent by weight):

$$A = \frac{\%\ CaO \times 1.785}{(\%\ CaO \times 1.785) + (\%\ MgO \times 2.092)} \times 100$$

The values for CaO and MgO should not include any calcium or magnesium carbonates found as core in the lime. Magnesium carbonate dissociates at a much lower temperature than calcium carbonate and also the $MgCO_3$ portion is completely calcined long before the calcium portion. Therefore any loss on ignition in the lime analysis should be considered as $CaCO_3$, not $MgCO_3$.

When only the stone analysis is known, "A" can be determined as follows:

$$A = \frac{\%\ CaCO_3}{\%\ CaCO_3 + \%\ MgCO_3} \times 100$$

This value of "A" does not correct for the amount of core in the sample. With the core corrected for, the equation becomes:

$$A = \frac{\%\ CaCO_3\ (100 - \%\ CaCO_3\ \text{in final product})}{\%\ CaCO_3\ (100 - \%\ CaCO_3\ \text{in final product}) + \%\ MgCO_3} \times 100$$

On the chart (Fig. 1) run from the "equivalent CO_2" to the particular fuel, to "A" factor and down to "heat used in millions of B.t.u.'s per ton of oxides" as the example lines indicate. One of these is for a high calcium lime, mixed feed kiln using coke at high efficiency. The other is for a portland cement clinker kiln using natural gas at the commonly obtained efficiency.

To obtain heat used per ton of actual product produced, the heat consumption per ton of oxides needs to be multiplied by the respective percentage of oxides in the product as:

$$\text{Millions of B.t.u. per ton of product} = \text{Millions of B.t.u. per ton of oxides} \times \frac{(\%\ MgO + \%\ CaO)}{100}$$

In using this chart for cement kilns, the source of the oxides of calcium and magnesium is considered as only from their carbonates in the feed. Any other combined calcium or magnesium would be included with the argillaceous matter. The amount of CaO and MgO in the product must be calculated before the clinkering zone and formation of multi-calcium compounds. Thus heat consumption for the lime-producing mixed feed kiln would be 3,800,000 B.t.u. per ton of product produced, and for the cement clinker kiln would be 5,600,000 B.t.u. per ton of product produced. This does not take account of the stack dust loss which in some rotary kiln installations may represent a substantial figure. However, this would be fairly constant.

To correct for the quantity of CaO

*Research chemical engineer, Azbe Corp., St. Louis, Mo.

WARREN H. WEISZ *is a 1947 graduate of the University of Missouri in chemical engineering. During World War II he was a first lieutenant in the armored artillery. Since graduation from the university he has been on the Azbe Corp. staff, initially in the laboratory, and later in the field engaged in testing and studying both vertical and rotary kilns. He now has charge of lime research, delving into problems pertaining to calcination and hydration.*

Warren H. Weisz

In the current article, Mr. Weisz gives in considerable detail the correct manner of kiln performance evaluation by means of gas analysis. The article is as applicable to vertical as to rotary kilns, to lime and also cement kilns, and for any fuel including coke, wood, oil, or natural gas.

THE EDITORS

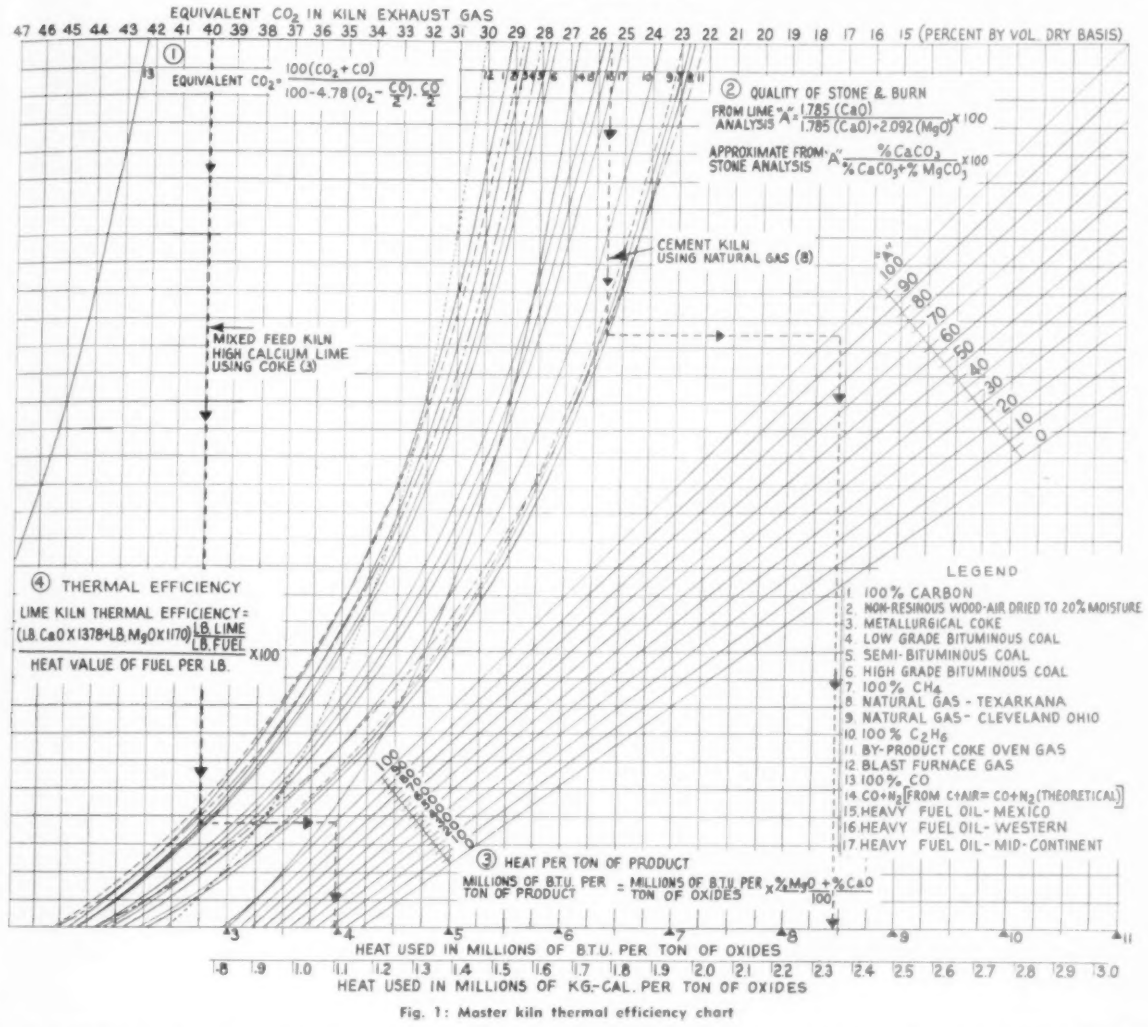

EQUIVALENT CO_2 IN KILN EXHAUST GAS
47 46 45 44 43 42 41 40 39 38 37 36 35 34 33 32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17 16 15 (PERCENT BY VOL. DRY BASIS)
① EQUIVALENT $CO_2 = \frac{100(CO_2+CO)}{100-4.78(O_2-\frac{CO}{2})-\frac{CO}{2}}$
② QUALITY OF STONE & BURN
FROM LIME "A" ANALYSIS $A=\frac{1.785(CaO)}{1.785(CaO)+2.092(MgO)}\times 100$
APPROXIMATE FROM STONE ANALYSIS "A" $\frac{\%CaCO_3}{\%CaCO_3+\%MgCO_3}\times 100$
CEMENT KILN USING NATURAL GAS (8)
MIXED FEED KILN HIGH CALCIUM LIME USING COKE (3)
④ THERMAL EFFICIENCY
LIME KILN THERMAL EFFICIENCY = $\frac{(LB.CaO\times 1378+LB.MgO\times 1170)\frac{LB.\ LIME}{LB.\ FUEL}}{\text{HEAT VALUE OF FUEL PER LB.}}\times 100$
③ HEAT PER TON OF PRODUCT
MILLIONS OF B.T.U. PER TON OF PRODUCT = MILLIONS OF B.T.U. PER TON OF OXIDES $\times \frac{\%MgO+\%CaO}{100}$
LEGEND
1 100% CARBON
2 NON-RESINOUS WOOD-AIR DRIED TO 20% MOISTURE
3 METALLURGICAL COKE
4 LOW GRADE BITUMINOUS COAL
5 SEMI-BITUMINOUS COAL
6 HIGH GRADE BITUMINOUS COAL
7 100% CH_4
8 NATURAL GAS - TEXARKANA
9 NATURAL GAS - CLEVELAND OHIO
10 100% C_2H_6
11 BY-PRODUCT COKE OVEN GAS
12 BLAST FURNACE GAS
13 100% CO
14 $CO+N_2$ [FROM C+AIR = $CO+N_2$ (THEORETICAL)]
15 HEAVY FUEL OIL - MEXICO
16 HEAVY FUEL OIL - WESTERN
17 HEAVY FUEL OIL - MID-CONTINENT
HEAT USED IN MILLIONS OF B.T.U. PER TON OF OXIDES
.8 .9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 3.0
HEAT USED IN MILLIONS OF K.G.-CAL. PER TON OF OXIDES

Fig. 1: Master kiln thermal efficiency chart

that is made in the kiln but lost through the stack use the following:

$$\text{B.t.u. per ton oxide produced} = \frac{\text{B.t.u. ton oxide}}{100 - \text{average \% CaO lost through stack}}$$

This value can then be changed to B.t.u. per ton produced as shown previously.

The master chart is arranged for many fuels whose analysis is given in Table I, and "A" includes the complete range of product compositions. For any particular plant the fuel would always be the same and the product would not vary greatly, permitting construction of a simple two curve chart from the master chart.

If incomplete combustion loss is negligible, then an even simpler approach can be devised which would eliminate required computation of "equivalent CO_2," as shown by Fig. 2, for a high calcium lime kiln using high grade bituminous coal (No. 6 in Fig. 1).

When combustion is complete and only excess air affects the equivalent CO_2, the upper part of this chart would apply to all fuels, thus only the lower portion needs to be compiled from data presented by the master chart.

The "heat used" represents the high heat value of the fuel which is that more commonly used in this country. We would prefer to use the low heat value but must conform to generally accepted practices.

Knowing "heat used," thermal efficiency may be calculated. This may be simple if we are not particular and may border on the impossible if we are. The simple equation for lime would be:

$$\text{Thermal efficiency} = \frac{(\text{lb. CaO} \times 1378 + \text{lb. MgO} \times 1170)\ \frac{\text{lb. lime}}{\text{lb. fuel}}}{\text{Heat value of fuel}} \times 100$$

The more complex equation as arranged for cement would be:

$$\text{Thermal efficiency} = \frac{(\text{lb. CaO} \times 1378 + \text{lb. Mgo} \times 1170 + \text{lb. kaolin} \times 245)\ \frac{\text{lb. clinker}}{\text{lb. fuel}}}{\text{Low heat value of fuel} + \text{total heat of exothermic reaction} + \text{recuperative influence of argillaceous matter}} \times 100$$

The complications arise from the differences between low and high heat values of the fuel, from heat of exothermic reaction generated within the kiln, from the recuperative influence of argillaceous matter, or, in the case of lime, from the core which brings heat from the preheating zone to the cooler, making possible its recovery, and from the fact that the $MgCO_3$ dissociation level is substantially lower than that of $CaCO_3$. Thus heat which is spent as far as calcia is concerned is still capable of calcining magnesia.

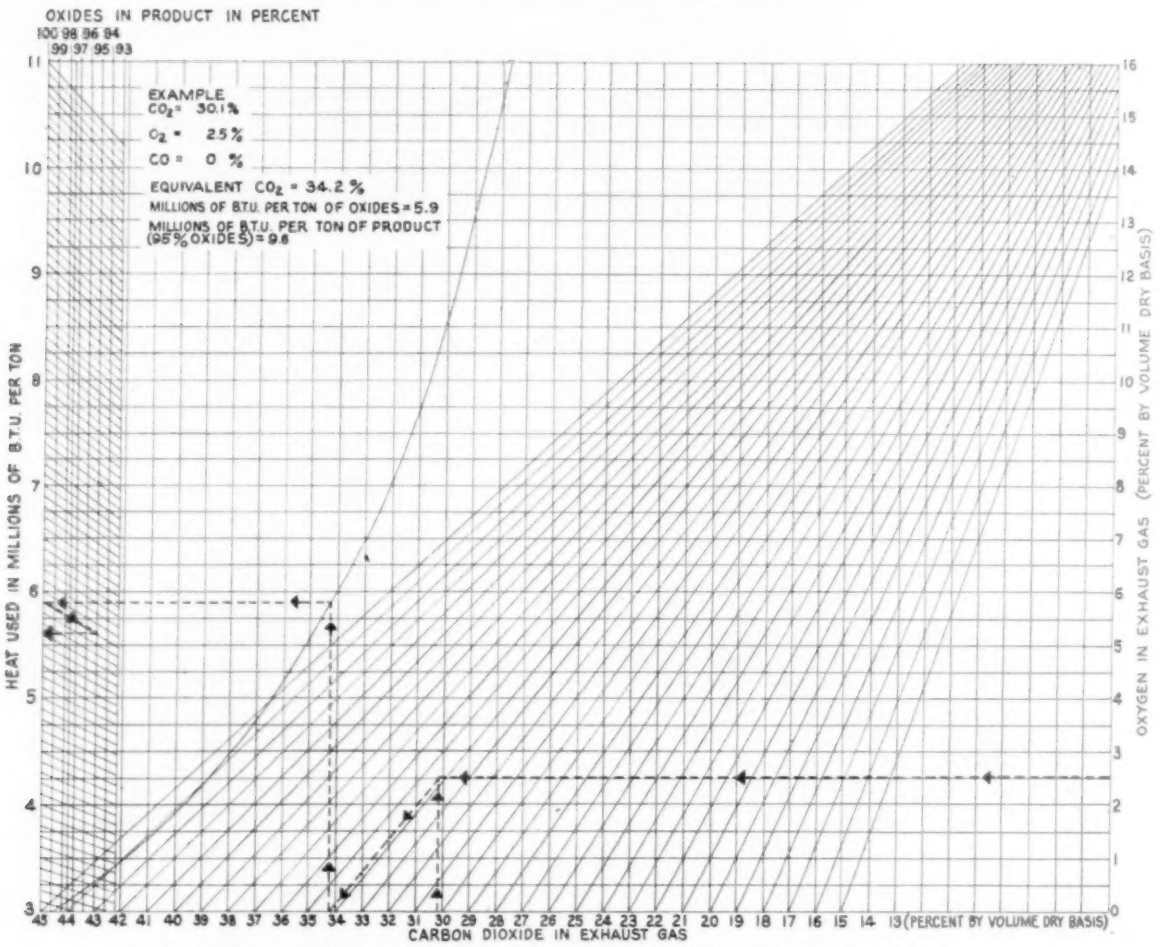

OXIDES IN PRODUCT IN PERCENT
100 98 96 94
99 97 95 93
EXAMPLE
CO_2 = 30.1%
O_2 = 2.5%
CO = 0 %
EQUIVALENT CO_2 = 34.2 %
MILLIONS OF BTU. PER TON OF OXIDES = 5.9
MILLIONS OF B.T.U. PER TON OF PRODUCT (95% OXIDES) = 9.6
HEAT USED IN MILLIONS OF B.T.U. PER TON
OXYGEN IN EXHAUST GAS (PERCENT BY VOLUME DRY BASIS)
CARBON DIOXIDE IN EXHAUST GAS (PERCENT BY VOLUME DRY BASIS)

Fig. 2: Kiln thermal efficiency chart (high grade calcium lime kiln "A"=97, high grade bituminous coal)

Table I. Fuels shown on master kiln thermal efficiency chart (Fig. 1)

No. 1: 100 percent carbon

HHV	14,550 B.t.u./lb.	*Products of combustion*	
		CO_2	3.664 lb./lb. = 31.32 cu. ft./lb.
		N_2	8.863 lb./lb. = 119.2 cu. ft./lb.

No. 2: Non-resinous wood—air dried to 20 percent moisture—"as received basis"

Moisture	20 percent	HHV	6730 B.t.u./lb.
Ash	0.19 percent	LHV	6230 B.t.u./lb.
Carbon	40.36 percent		
H_2 available	1.04 percent	*Products of combustion*	
H_2 unavailable	4.23 percent	CO_2	1.4788 lb./lb. = 12.645 cu. ft./lb.
O_2	33.86 percent	H_2O	0.67384 lb./lb. = 14.17 cu. ft. /lb.
N_2	0.32 percent	N_2	3.8549 lb./lb. = 51.80 cu. ft./lb.

No. 3: Metallurgical coke—"dry basis"

Ash	13.40 percent	HHV	12,414 B.t.u./lb.
C	81.39 percent	LHV	12,305 B.t.u./lb.
H_2 available	1.15 percent	*Products of combustion*	
H_2 unavailable	0.24 percent	CO_2	2.982 lb./lb. = 25.51 cu. ft./lb.
S	0.88 percent	SO_2	0.01759 lb./lb. = 0.1015 cu. ft./lb.
O_2	1.92 percent	H_2O	0.1028 lb./lb. = 2.177 cu. ft. /lb.
N_2	1.02 percent	N_2	7.5609 lb./lb. = 101.6 cu. ft./lb.

No. 4: Low grade bituminous coal—"as received basis"

Moisture	13.0 percent	H_2 unavailable	2.05 percent
Ash	10.7 percent	S	3.16 percent
C	51.05 percent	O_2	16.40 percent
H_2 available	2.70 percent	N_2	0.94 percent

A battery of shaft kilns. Kiln performance evaluation by means of gas analysis is as applicable to vertical as to rotary kilns, to lime and cement kilns, and for any type fuel

Table I (Cont.)

HHV .....9307.4 B.t.u./lb.
LHV .....9051.4 B.t.u./lb.
Products of combustion
CO_2 ...1.8705 lb./lb.=16.00 cu. ft./lb.
SO_2 ....0.1029 lb./lb.=0.60 cu. ft./lb.
H_2O ....0.5558 lb./lb.=11.7 cu. ft./lb.
N_2 .....5.310 lb./lb.=71.4 cu. ft./lb.

No. 5: Semi-bituminous coal—"as received basis"

Moisture	3.5 percent	HHV	14,081 B.t.u./lb.
Ash	4.2 percent	LHV	13,712 B.t.u./lb.
C	80.3 percent		
H_2 available	3.9 percent	*Products of combustion*	
H_2 unavailable	0.71 percent	CO_2	...2.9422 lb./lb.=25.18 cu. ft./lb.
S	0.70 percent	SO_2	....0.0140 lb./lb.=0.08 cu. ft./lb.
O_2	5.65 percent	H_2O	....0.4471 lb./lb.=9.44 cu. ft./lb.
N_2	1.04 percent	N_2	.....8.1803 lb./lb.=110 cu. ft./lb.

No. 6: High grade bituminous coal—"as received basis"

Moisture	3.24 percent	HHV	13,919 B.t.u./lb.
Ash	7.00 percent	LHV	13,432 B.t.u./lb.
C	78.10 percent		
H_2 available	4.25 percent	*Products of combustion*	
H_2 unavailable	0.58 percent	CO_2	.....2.85 lb./lb.=24.38 cu. ft./lb.
O_2	4.65 percent	SO_2	..0.0189 lb./lb.=0.1091 cu. ft./lb.
S	0.95 percent	H_2O	....0.4642 lb./lb.=9.76 cu. ft./lb.
N_2	1.23 percent	N_2	....8.0772 lb./lb.=108.6 cu. ft./lb.

No. 7: 100 percent CH_4

HHV .....23,879 B.t.u./lb.
LHV .....21,520 B.t.u./lb.
Products of combustion
CO_2 ....2.744 lb./lb.=23.48 cu. ft./lb.
H_2O .....2.246 lb./lb.=47.4 cu. ft./lb.
N_2 ....13.275 lb./lb.=178.5 cu. ft./lb.

No. 8: Natural gas—Texarkana—"as received basis"

CH_4	92.48 percent	*Products of combustion*	
CO_2	2.12 percent	CO_2	...2.5612 lb./lb.=21.92 cu. ft./lb.
N_2	5.4 percent	H_2O	....2.078 lb./lb.=43.68 cu. ft./lb.
HHV	21,903 B.t.u./lb.	N_2	....12.334 lb./lb.=165.7 cu. ft./lb.
LHV	19,731 B.t.u./lb.		

No. 9: Natural gas—Cleveland, Ohio—"as received basis"

CH_4	64.89 percent		
C_2H_6	33.26 percent	*Products of combustion*	
N_2	1.85 percent	CO_2	...2.7541 lb./lb.=23.57 cu. ft./lb.
HHV	22,780 B.t.u./lb.	H_2O	...2.0554 lb./lb.=43.21 cu. ft./lb.
LHV	20,613 B.t.u./lb.	N_2	...12.7548 lb./lb.=171.5 cu. ft./lb.

No. 10: 100 percent C_2H_6

HHV .....22,320 B.t.u./lb.
LHV .....20,432 B.t.u./lb.
Products of combustion
CO_2 ....2.927 lb./lb.=25.02 cu. ft./lb.
H_2O .....1.798 lb./lb.=37.9 cu. ft./lb.
N_2 ....12.394 lb./lb.=166.5 cu. ft./lb.

No. 11: By-product coke oven gas—"as received basis"

H_2 available	9.565 percent	LHV	15,307 B.t.u./lb.
CH_4	40.45 percent		
CO	15.01 percent	*Products of combustion*	
CO_2	2.975 percent	CO_2	...1.3755 lb./lb.=11.76 cu. ft./lb.
N_2	32.0 percent	H_2O	..1.7633 lb./lb.=37.12 cu. ft./lb.
HHV	17,167 B.t.u./lb.	N_2	...8.50076 lb./lb.=114.2 cu. ft./lb.

No. 12: Blast furnace gas—"as received basis"

H_2 available	0.24 percent	LHV	1173.5 B.t.u./lb.
CO	24.38 percent	*Products of combustion*	
CO_2	18.88 percent	CO_2	...0.57181 lb./lb.=4.89 cu. ft./lb.
N_2	56.5 percent	H_2O	..0.92145 lb./lb.=0.452 cu. ft./lb.
HHV	1195.8 B.t.u./lb.	N_2	...1.09160 lb./lb.=14.67 cu. ft./lb.

No. 13: 100 percent CO

HHV .....4407 B.t.u./lb.
LHV .....4407 B.t.u./lb.
Products of combustion
CO_2 ....1.571 lb./lb.=13.44 cu. ft./lb.
N_2 .....1.900 lb./lb.=25.54 cu. ft./lb.

No. 14: CO + N_2 [from C + Air = CO + N_2 (theoretical)]—"as received basis"

CO	34.5 percent		
N_2	65.5 percent	*Products of combustion*	
HHV	1500 B.t.u./lb.	CO_2	....0.542 lb./lb.=4.633 cu. ft./lb.
LHV	1500 B.t.u./lb.	N_2	....1.3105 lb./lb.=17.62 cu. ft./lb.

(Continued on page 113)

Lime Consumption By Alkali Plants

NATIONAL LIME ASSOCIATION, in a recent publication of *Limeographs*, released figures on the amount of lime produced and consumed by United States alkali plants, which, it stated, was the first time such figures have been published. It estimated the current consumption of lime, all of which is captive production, for soda ash, caustic soda and sodium bicarbonate production, as follows:

Present annual production via lime-soda process	Tons per year
Soda ash	4,000,000
Caustic soda	500,000*
Sodium bicarbonate	145,000

To produce the above tonnage of alkalies, the following theoretical amounts of quicklime are required:

0.53 tons of quicklime for 1 ton of soda ash
0.71 tons of quicklime for 1 ton of caustic soda
0.33 tons of quicklime for 1 ton of sodium bicarbonate

Minimum annual lime consumption for these three principal alkalies is estimated as follows:

2,000,000	tons of quicklime for soda ash
350,000*	tons of quicklime for caustic soda
48,000	tons of quicklime for sodium bicarbonate
2,398,333	total annual tons of quicklime for alkali production

The figures marked with asterisks will become progressively smaller in time. It was noted that it is becoming increasingly evident that "lime-soda" process caustic soda is gradually on its way out in favor of electrolytic process caustic soda.

Buys Fluorspar Mine

REYNOLDS MINING CORP., subsidiary of Reynolds Metals Co., Richmond, Va., has purchased the Poncha Springs fluorspar mine in Colorado, from Fluorspar, Inc., according to an announcement by Walter L. Rice, president of Reynolds. The acquired property included about 90 acres, 22 mining claims and a partly completed flotation plant. The flotation plant has since been completed and plans are now in progress for some additions to the plant.

Another Zoning Conflict

STEERS SAND AND GRAVEL CO., Northport, L. I., N. Y., has appealed to the Northport Zoning Board of Appeals for permission to continue excavating operations on the former Chesebrough property. Although the firm has been using this tract for nearly a year, it allegedly had been doing so in violation of zoning laws. The issue came to a head recently when the firm announced plans of tapping adjacent tracts. A committee, formed to fight the plan, obtained support from local residents and village officials, resulting in a court order which upheld the zoning law and confined the company to its original holdings.

Addition of Clinker Grit to Concrete

Use of coarse-ground clinker in concrete mixes as a means of increasing ultimate strength

By D. A. WADIA*

IT IS A WELL-KNOWN FACT that during the first few months of hydration of cement pastes much of the cement remains in an unhydrated state. This potentially hydratable material can of course be made available for quicker hydration by finer grinding. But, apart from the fact of increased cost, the results obtained with very fine cements are not encouraging, the resultant concrete being especially prone to excessive shrinkage. Further, Kuehl has shown that no advantage is gained by grinding a cement beyond a certain limiting stage, and this has been confirmed by other investigators. Mazza,[1] for instance, found that there is no increase in the ultimate strengths if the specific surface exceeds a limiting value, which for the commercial sample he studied was 1800 sq. cm. per gram (as determined by the Wagner turbidimeter).

Actually, the coarser, slower hydrating particles present in cement cannot be regarded as a waste, for they have a definite and useful function to perform. They serve as the best available aggregate, since bonding with the hydrated cement gel is far more intimate and thorough than can be expected with sand or other fine aggregate. Anderegg[2] describes an interesting experiment that was carried out to determine whether the coarser fraction of cement—which for early ages at least can be regarded as inert—could be replaced advantageously by a cheaper aggregate. A sample of the cement was elutriated, and a portion of the coarser fraction was replaced by the same quantity of sand of the same fineness. The results showed that portland cement in the coarser sizes makes an excellent aggregate that is far superior to sand and other extraneous fine aggregate.

While it is generally agreed that finer grinding helps in the development of early strengths, this very characteristic will deprive the cement of a residue of hydratable material that may be of great value in increasing the durability of concrete at later ages. The superior durability of concrete work in which coarse ground cement of two or three decades ago was used seems to be particularly noticeable in the case of concrete roads. A recent investigation of 1270 miles of concrete roads by the state highway commission of Kansas showed that the portion laid before the year 1930 was more satisfactory than that laid since. The specification for the whole of the road was exactly the same, except for the fineness, which was greater in the case of the cement used subsequent to 1930. Significantly enough, in Germany, which has a deservedly high reputation for the excellence of its concrete highway system, the specifications require a coarse-ground cement for concrete roads.

Very fine grinding of clinker by itself, therefore, cannot be regarded as the best means of utilizing a cement's strength-giving potentialities. To compensate for the early and rapid hydration of modern fine cements, the addition of a small proportion of coarsely ground clinker to concrete mixes will be found advantageous. This clinker grit will serve as a valuable residue for the development of strengths at late ages, and will greatly help in improving a concrete structure's permanency and resistivity to external disintegrating influences. Kuehl's[3] conclusions on this subject (as quoted in ROCK PRODUCTS, May, 1951) are significant: "By adding a very coarse fraction as admixture, an extremely finely ground cement cannot only be improved in regard to the economic efficiency of its production, but with regard to the absolute maximum of its hardening strength."

While the primary purpose of adding clinker grit is to provide a reserve of hydratable particles in concrete, its presence will also help materially in increasing early strengths, since as already pointed out, the coarser particles of cement are by far the best available fine aggregate.

Composition and Fineness

A definite idea of the desirable percentage of clinker addition to concrete mixes can only be had after proper laboratory and field tests. As to the composition of clinker grit, it need not be similar to that of normal portland cement as its function is entirely different from that of normal cement. A brief indication of the desirable composition and fineness of clinker grit is given below.

Composition. Since the clinker grit is added primarily to allow for the development of strengths of late ages, no advantage will be gained by producing a clinker with high C_3S content, particularly since the ultimate strength developed by C_2S is the same as, if not higher, than that obtained with C_3S. A lime content in the clinker grit of about 60-61 percent will be quite sufficient. Further, it would be advantageous to keep down the C_3A content and thus increase the sulfate resistance of the clinker grit. The clinker grit should therefore have higher percentages of C_2S and C_4AF and lower percentages of C_3A and C_3S. Gypsum addition can be dispensed with since the clinker grit (due to its relative coarseness) will itself be slower setting.

Degree of fineness. Table I gives an approximate indication of the time required for the hydration of cement particles of various sizes, the setting time figures representing the average values determined for a number of portland cement samples. Actually, the time of hydration of clinker grit (which has a high C_2S and low C_3A content) will be more than the values indicated, because the most quickly hydrated compound in clinker is C_3A, and the slowest hydrating is C_2S. Roughly speaking it will be seen that grinding the clinker so that a majority of the particles are about 40 to 80 microns diameter will be quite sufficient.

Table I. Time required for hydration of cement particles of various sizes[4]

Size in microns (μ)	Percent average amount	Time required for cement hydration
Under 10	21	Less than 24 hr.
10-20	16	24 to 48 hr.
20-30	8	4 days
30-43	30	7 days
44-74	16	28 days or more
Over 74	9	Indefinite period

200 mesh is equal to 74 microns
393 mesh is equal to 43 microns

*Assistant chemist, Bhupendra Cement Works, Surajpur, India.

Conditions of Manufacture

Some of the modifications that can be advantageously introduced in the various stages of manufacture of clinker grit are mentioned below. The cost of manufacture will be seen to be considerably less than that of standard portland cement. The main advantage, however, lies in the fact that large reserves of low grade limestones can be utilized which at present are unsuitable for the manufacture of standard portland cement. Clinker grit can therefore be most advantageously manufactured in those cement plants which have difficulty in obtaining the higher grades of limestone. Indeed, from the point of view of conservation of high purity limestone, it would be objectionable to use any but poorer grade stone for clinker grit manufacture.

Raw material grinding. Provided lower grade limestone is used as raw material, it would be permissible to grind the stone to a lesser degree of fineness than would be necessary in the case of high purity limestones, as in the former case the raw material already approximates cement rock in composition. This will mean lower grinding costs and increased mill output.

Burning. Because of the very low lime content in the kiln feed, there will be considerable saving in fuel consumption (lower lime kiln feeds require lower burning temperature). Further, as a consequence of the lower burning temperature, wear and tear on the kiln lining will be less, and the frequency of kiln stoppages for relining will be reduced. This is an important factor in reducing manufacturing costs, since every stoppage of the kiln is equivalent to loss of production during that period.

Clinker grinding. It is well known that the ultimate reduction of clinker to a very fine size is the most inefficient and power consuming stage of grinding, due to the tendency of the fine particles to form a coating on the grinding media and mill lining plates. Since the clinker grit will be relatively coarse ground, the mill output and grinding efficiency will be much higher. The extent of this improvement will be appreciated when it is remembered that in the manufacture of portland cement, the use of dispersing agents (which help by preventing formation of lumps and coatings) by itself is claimed to reduce power costs by 30-50 percent. A further simplification is that gypsum addition is not required, thus obviating the necessity for checks on its rate of flow, etc.

Precautionary Measures

Three important points that will have to be taken into account for obtaining satisfactory results are:

(1) The clinker grit should have a very low free lime content. This is even more important than in the case of standard portland cement, since in the event of a clinker containing excessive free lime, the coarser particles will give a higher expansion in the Le Chatelier test (due to retarded hydration) than the more finely ground portion. However, because of the very low lime content of the clinker grit, burning will be easy and no difficulty will be encountered on this point.

(2) Particular care should be taken to provide proper curing conditions. Curing helps to produce an impervious material that will retain uncombined water. This retained water reacts in course of time with the unhydrated compounds of cement and increases the strength and watertightness of the concrete. Unless, therefore, a sufficient amount of water is retained in the concrete, the clinker grit will serve as little else than fine aggregate and the very purpose of its addition will be negated.

(3) The dry mixing of the clinker grit and cement should be as thorough as possible to prevent segregation, etc.

Testing of Clinker Grit

The present methods of chemical analysis and fineness determinations of portland cement are equally suitable for the testing of clinker grit. For other tests, however, the methods will have to be modified. This applies in particular to the testing of the strength and durability characteristics of clinker grit. Since clinker grit is used as an adjunct to standard portland cement, it follows that a proper indication of its performance can only be had when the test briquets, cubes, etc. are gauged from a mixture of portland cement, clinker grit and standard sand, rather than with clinker grit and standard sand alone. Even then no great importance can be attached to the early strength figures (which will not be much higher than those obtained with corresponding cement-sand test specimens), since the main purpose of adding clinker grit is to allow the development of strength at late ages. In this connection the method followed by Larmour, McMaster and Jaques[5] for the evaluation of a pozzolan can be conveniently adopted. In their method the test specimens were autoclaved for strength development after curing for 24 hr. at 70 deg. F. The autoclaving was carried out continuously at two pressures. The first pressure was 100 p.s.i. for 24 hr., following which the pressure was raised to 300 p.s.i. for 6 hr. Under these high temperature-pressure conditions the reaction between the pumicite and cement was carried out practically to the ultimate limit. Autoclaving of clinker grit-cement-sand mortar test specimens will provide valuable information of the ultimate strength characteristics of clinker grit.

Also, for the Le Chatelier test, to offset any difficulty in preparing a paste of the comparatively coarse clinker grit with water, it would be advantageous to mix the clinker grit with portland cement (having a known negligible expansion) in the proportion of 1:1, and use this mixture of clinker grit for the soundness test.

Further, for testing the "durability" of concrete, special tests will have to be developed for the reproduction of extreme conditions of exposure and weathering.

Applications of Clinker Grit

The use of clinker grit will be specially beneficial for concrete road construction, particularly because in this field fine cements have been found to be of doubtful advantage. Addition of clinker grit will permit the utilization of the high early strength characteristic of standard portland cement, while at the same time an adequate reserve of hydratable particles is made available for late strength development. Further, by increasing or decreasing the percentage addition of clinker grit, the degree of durability and strength development of the concrete structure can be varied at will. Such a wide choice of degree of durability and strength development would be impossible in the case of standard or coarse-ground portland cement alone.

Its applicability could further be extended to concrete work in which rapid hardening or low heat cements (both of which are ground finer than standard portland cement) are employed. Indeed, it would be sound concrete practice to add clinker grit to all concrete mixes that are designed for first class jobs where watertightness, resistivity and permanency are desired. Its use need not necessarily increase the cost of construction, since in most cases clinker grit addition will permit the employment of leaner mixes. Apart from the economy effected in the replacement of the much costlier standard cement, the cement's potentialities will be much more efficiently utilized, since finely ground portland cement is more effective in increasing the strength of lean rather than rich mixes (due to the increased covering power of the fine cement not being properly taken advantage of in the latter case).

It will be seen therefore that there is quite an extensive field for the sale of clinker grit. Even if the market demand is irregular, a cement plant can readily change over, as required, from the manufacture of clinker grit to the manufacture of portland cement, or vice versa, since the switchover merely entails a change in composition of the raw mix.

Literature Cited

1. Mazza (Argentina, 1947) Abstracted in *Chemical Abstracts* (1948).
2. Anderegg, F. O., "Particle Size Distribution of Portland Cement and What It
(Continued on page 110)

Lightweight Aggregate

New lightweight aggregate plant of The Mineral Products Co., Kansas City, Kan., uses the sintering process to develop lightweight aggregate from raw clay

Mineral Products Co. builds plant at Kansas City, Kan., with two grate-type sintering machines

By TIP BROWN

SINTERING RAW CLAY AND SHALE INTO LIGHTWEIGHT AGGREGATE

A NEW LIGHTWEIGHT AGGREGATE plant for the greater Kansas City area, operating under the name of The Mineral Products Co., began shipping early in January. The plant is immediately west of the city limits of Kansas City, Kan., on a six-acre site. Adjoining it are 400 acres of available clay land which has been leased by the company to insure an adequate raw material supply.

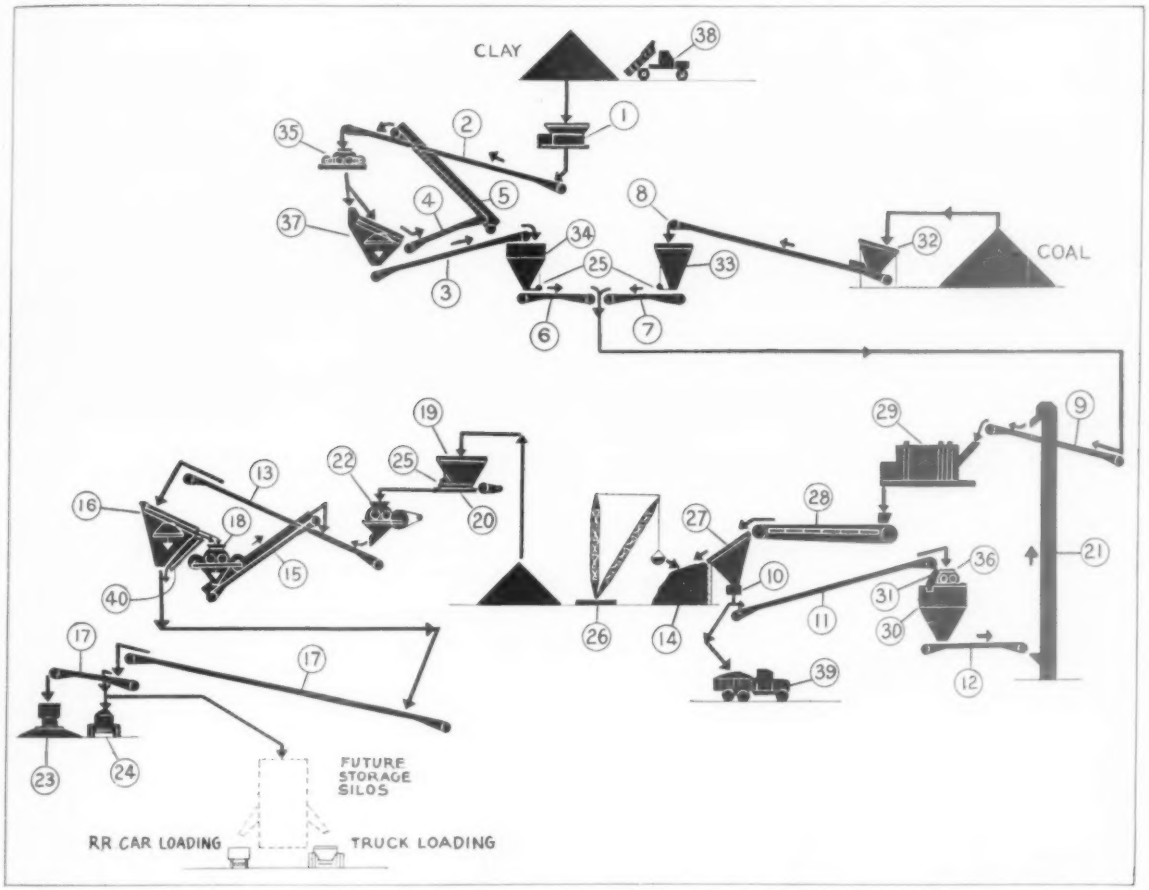
The Dwight-Lloyd sintering process is used to develop the lightweight aggregate from the raw clay. The manufactured product is produced by expansively sintering clay and shale at 2400 deg. F. until it is vitrified. Executives of the Dwight-Lloyd Co., R. L. Hyde, president, and C. E. Rowan, manager, supervised the initial sintering tests using the pilot plant operating at their laboratory. Plant design was directed by Elmer Citron, of Pittsburg, Kan., who is mechanical engineer for the Pittsburg and Midway Coal Mining Co. Construction of the plant has been under the direction of the Quaker Valley Constructors, Pittsburg, Kan.

The new plant has excellent highway and railroad connections with direct access to Kansas highway No. 32. Railroads serving the plant are the Kansas City and Kaw Valley railroad, and the Kansas and Missouri Railway and Terminal Co., the latter being a part of the Kansas City Southern railroad system.

Construction was started May 1, 1951, and reached completion in nine months. The buildings are of steel and concrete; 450 tons of structural steel and 600 cu. yd. of concrete were used in the construction. The main building is 100 x 160 ft., with a maximum height of 55 ft. and 16,000 sq. ft. of area. A 28- x 30-ft. concrete masonry office building is on the west side of the property. Attention has been given to details for the comfort and convenience of employes and those doing business with the company. A 30-ton Webb scale has been installed on the south side of the building for weighing trucks; a 20- x 30-ft. laboratory, also of concrete masonry, has been built north of the office building and will house the sintering pilot plant; and a separate concrete masonry structure, 20 x 30 ft., will contain employe locker and shower facilities. Office and plant employes, exclusive of the clay pit, now number 17 people.

Clay mining operations, under contract with the J. A. Tobin Construction Co. of Kansas City, will utilize a ¾-cu. yd. Northwest diesel dragline for removing raw clay from hillside locations to 10-ton dump trucks. These, in turn, will haul one mile to receiving hoppers or storage facilities at the east end of the plant. About 800 t.p.d. of raw clay are needed to keep the plant at capacity operation.

Left: Blending the clay and coal by variable speed belt conveyors. Center: Sintering machine in operation; the sintered cake discharges to the cooling pit where it is reclaimed by clamshell. Right: Control station at the sintering operation floor controls all the operations from clay preparation through sintering. Another panel is located at the crushing plant



Flowsheet of Mineral Products Co. lightweight aggregate plant. (1) Clay feeder, (2) Run-of-mill clay belt conveyor, (3) Sized raw clay belt, (4) Oversize raw clay belt conveyor, (5) Oversize raw clay belt—recycle, (6) Remote control feeder—clay, (7) Remote control feeder—coal, (8) Coal belt conveyor, (9) Blended clay and coal belt conveyor, (10) Reversible apron conveyor, minus ½-in. sintered material, (11) Minus ½-in. sintered material apron conveyor—recycle, (12) Minus ½-in. sintered material apron feeder, (13) Minus 2-in. finished sinter material belt conveyor, (14) Cooling pit for sinter cake, (15) Minus ⅜-in. material recycle belt conveyor, (16) 5- x 14-ft. vibrating screen, (17) Minus ⅜-in. material loading conveyor, (18) Crusher, (19) Sinter receiving hopper, (20) Plate feeder, (21) Recycle belt elevator, minus ½-in. sinter, (22) Double hob-roll crusher, (23) Railroad car loading, (24) Truck loading, (25) Rack and pinion gate, (26) Clamshell, (27) Minus ½-in. bar screen and chute, (28) Sintering machine, (29) Rotary pug mill, (30) Surge hopper, (31) Minus ½-in. sinter by-pass chute, (32) Feed hopper, (33) Coal bin, (34) Clay bin, (35) Double-roll crusher, (36) Smooth-roll crusher, (37) 5- x 14-ft. vibrating screen, (38) Run-of-mill raw clay truck, (39) Minus ½-in. sinter truck loading, (40) ⅜-in. x 7-mesh by-pass chute

Provision has been made for additional storage under roof of a three-day reserve supply.

Plant Operation

The raw clay is sized by first crushing with a clay disintegrator and then passing through a 5- x 14-ft. screen. The oversize is re-run for further crushing and the undersize is conveyed to a 10-ton clay proportioning bin which completes the raw clay preparation.

Coal is used for fuel and open storage for ten carloads, arriving by rail, is provided at the east end of the property. From there it is moved by belt conveyor to a ring pulverizer where it is reduced to proper size for use in sintering. From the crusher, the coal is discharged into a 50-ton proportioning bin. The daily consumption amounts to 50 tons.

By means of variable speed feed belts from the clay and coal storage bins, the two products are fed to a conveyor which carries them to a 5- x 10-ft. pelletizer above the sintering machine. On this same belt, provision is made for introducing any amount of re-run aggregate that may be desired. In the pelletizer, clay, coal, re-run material, and necessary water are thoroughly mixed and the mixture discharged by gravity to the sintering machine hopper.

Two Dwight-Lloyd sintering machines, 42-in. x 33-ft. effective grate area, are used to sinter the material received in the hoppers. The resulting cake from these machines is discharged over bar grizzlies into a cooling pit. The gases from the sintering process are discharged through fans into a 5- x 85-ft. self-supporting steel stack.

The cake is removed from the pit with a 2½-cu. yd. clamshell bucket and placed in an open stockpile for cooling. Later the same clamshell is used to start the material through the final crushing and sizing operation by reclaiming from the cooling stockpile and dumping into a receiving hopper. It is fed out of this hopper by a reciprocating plate feeder to a double hob-roll crusher, and then conveyed by belt to a 5- x 14-ft. double-deck screen, and any oversize is given final crushing in two double-roll crushers. The product sized to specifications through the screens and roll crushers is then conveyed by belt either to a railroad car loading station or to a truck loading station. The plant has a capacity of 600 cu. yd. of lightweight aggregate every 24 hr. The ordinary hopper-bottom gondola freight car will hold about 100 cu. yd.

Entire control of the plant is from two push button stations for remote control. One station is at the sinter-

Left: The sintered cake is removed from the cooling pit at the end of the sintering machine to an open stockpile for cooling by clamshell and then to the crushing plant. Right: Crushing and grading plant with receiving hopper at right and loading facilities at left

Raw clay feeder is in the clay storage shed. About 500 t.p.d. of raw clay are needed to keep the plant at capacity operation

ing operating floor and controls all of the operations from the clay preparation through the sintering; the second station is located at the products crushing point at a height of approximately 50 ft. where there is an unobstructed view of the entire preparation area.

Personnel

President of the company is Kenneth A. Spencer, also head of the Pittsburg and Midway Coal Mining Co. and the Spencer Chemical Co.; a vice-president of the coal company, George Nettles, serves also as vice-president of The Mineral Products Co.; B. F. Moats, Jr., who is assistant to Mr. Spencer, is secretary of the new organization; John Miller, a director of Pittsburg and Midway Coal Mining Co. and vice-president-treasurer of Spencer Chemical Co., is treasurer. Chief engineer for the company is R. G. Hardy, a graduate of the University of Illinois in ceramic engineering and formerly assistant superintendent of the roofing tile plant of Ludowici Celadon Co.

George Nettles, Jr., a graduate of the University of Kansas and formerly with the engineering firm of Black and Veatch, Kansas City, Mo., is plant manager; Paul Taylor, long engaged in the retail coal business in Kansas City, is office manager; and Fred Gades, who has been associated with sales in the lightweight aggregate field for some time, is sales engineer.

Beet-Sugar Technology

THE SUGAR INDUSTRY is interesting to limestone and lime producers as one of the earliest food industries to employ these minerals in processing. Since both the lime and the CO_2 gas effluent from the lime kiln are used, little commercial lime is purchased, but several limestone quarries depend largely on sugar factories for an outlet. The cane sugar industry in this country is confined to the state of Louisiana, but there are many sugar beet growing areas, and these are the chief limestone consuming areas.

A new book, "Beet-Sugar Technology,"* edited by R. A. McGinnis, of the Spreckels Sugar Co., California, came off the press late in 1951, and readers interested in the history of the beet sugar industry in the United States, or in the processing of sugar beets and beet sugar can find in it much of value. The book is a compendium by authors specializing in different phases of the industry. There is included a directory of all known beet sugar factories, both those existing and those that are more or less ancient history. Those in Canada are also listed.

Nothing is said in the chapter on growing sugar beets about the use of lime as a fertilizer, presumably because most soils where sugar beets are grown have plenty of calcium in some form, for this is an essential food element in growing sugar beets. A great deal is said, of course, on the use of lime in the processing, and lime chemists may find here suggestive material that can be applied in other chemical processing where lime is used. For example there are charts and data on the solubility of CaO in sugar solutions, which are interesting to all lime chemists since the sugar test for lime is common in determining lime characteristics. There are also charts showing the solubility of CO_2 in solutions of CaO or $Ca(OH)_2$.

In the clarifying of the sugar juice, other rock products such as diatomaceous earth or other filtering materials are used. This process is also explained in detail. Catalysts and ion exchange, according to the laws of colloid chemistry, are included.

There is a chapter on lime and carbon dioxide production, which will prove interesting to lime manufacturers since the beet sugar industry is one of the few which recovers and uses the CO_2 as well as the lime. The so-called Belgian lime kiln, a mixed-feed shaft kiln, is the one almost universally used by the beet-sugar industry. Coke and limestone are fed into it, and the top is sealed. Rotary kilns and the Ellerman calciner have been used to a small extent. While the mixed-feed lime kiln is little used in this country to manufacture commercial lime, a wealth of data on its operation will be found in this chapter by those who are interested. It is the most economical kind of kiln in fuel consumption and is much used in European lime plants for that reason.

Lime is also used in waste disposal and the recovery of by-products.

*Book Division, Reinhold Publishing Corp., 330 W. 42nd St., New York, N. Y., price $10.

Gravel Operation Sold

THE FRNKA BROTHERS gravel operation near Altair, Texas, has been purchased by Ewald Schomburg and E. J. Luedecke.

MISSOURI LIMESTONE PRODUCERS MEET WITH HIGHWAY ENGINEERS

Midwest association discusses percentage depletion, national affairs and merchandising of agstone; swaps ideas on crushed stone with engineers

AN INNOVATION AT this year's 7th annual convention of the Missouri Limestone Producers Association, February 5-6, was the presence of about 40 highway engineers from division and main offices. These men were guests of the association at a session devoted to common problems in the use of crushed stone for roads, and also at a cocktail party and banquet, all held in the Hotel Governor in Jefferson City, Mo. A question raised before the group, primarily an agricultural limestone promotion organization, was whether the association should be expanded to include all crushed stone producers. The board of directors appointed a committee to study the possibility further.

Officers were elected for the year during the meeting. President is Buford V. Everett, Everett and Clark, Plattsburg; vice-president, Charles E. Thomson, Dietz Hill Development Co., Kansas City; secretary-treasurer, Carl Partin, Milan. New members of the board of directors include Horace Krause, Columbia Quarry Co., St. Louis; Arthur R. Alvis, Butler; and J. J. Griesemer, Billings. They join the present board members: Ben P. Donnell, Valley Dolomite Corp., Bonne Terre, retiring president; R. W. Hunt, Neosho; and Kenneth Kilkenny, West Plains. Paul Doll was renamed association manager.

Legislation

A legislative report presented by Henry Andrae, Hendren and Andrae, association counsel, summarized the year's progress in percentage depletion, truck fee increase, and gasoline tax legislation, as well as other legislation of importance to agstone producers. The governor vetoed the truck cover bill recently, which would have required covering all truck loads with wood, canvas or metal. Testimony of the association helped bring the veto. As for gas tax and truck fee increases, Mr. Andrae reported the passage of bills authorizing these to be indefinite, though the state Senate may take them up shortly. Passage of these two pieces of legislation would benefit all limestone producers by providing more money for roads, he commented. Truck fees would go up moderately, and the gas tax increase (which has passed the House) is only one cent per gal.

Percentage Depletion

Percentage depletion, its theory and practice under the Revenue Act of 1951, was opened for discussion by Mr. Andrae. Horace Krause carried on to point out specific cases of percentage depletion allowances and to describe the efforts of the National Crushed Stone Association percentage depletion committee, of which he was formerly chairman, to have crushed stone of most grades declared chemical or metallurgical stone, and therefore able to qualify for 15 percent depletion allowance.

Allowances permitted by the revenue act are 5 percent for sand and gravel, 10 percent for $CaCO_3$ and $MgCO_3$, and 15 percent for chemical and metallurgical grades of limestone. The Bureau of Internal Revenue does not know what chemical grade of limestone is. In its early efforts to fight percentage depletion allowances, the bureau brought a geologist to give testimony that Tennessee has billions of tons of high grade chemical limestone. Mr. Krause said that his committee pointed out that the place utility value of these deposits was low due to the necessity for shipping long distances to point of use. The committee also rebutted that less than 6 percent of the limestone in the U. S. qualifies as chemical grade, and only four counties in the country have appreciable quantities of good dolomite. In return the Treasury Department asked for help in defining grades of stone.

To present a strong argument, Mr. Krause said that efforts are being taken by the N.C.S.A. committee to find as many references to chemical characteristics and requirements in state laws, specifications, codes, etc., in fact, anything that will support the argument that a chemical substance is involved. The support of Dr. W. A. Albrecht, chairman, Department of Soils, University of Missouri, was obtained to prove that all agstone reactions are chemical and that a chemical material is responsible. Agstone and its relation with potash and rock phosphate as soil conditioners is being developed by Dr. Albrecht, since the latter two materials qualify for 15 percent depletion allowance.

Mr. Krause mentioned other points

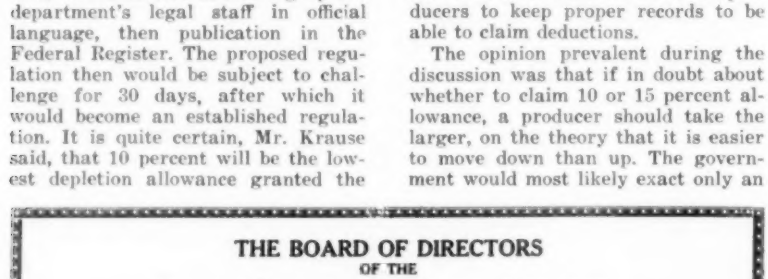
Newly elected officers of Missouri Limestone Producers Association are, l. to r., sitting, secretary-treasurer, Carl Partin, Milan; association manager, Paul Doll, Jefferson City; vice-president, Charles Thomson, Kansas City; retiring president, R. W. Hunt, Neosho. Standing, l. to r., are directors Ben P. Donnell, Bonne Terre; Arthur R. Alvis, Butler; J. J. Griesemer, Billings; and Horace Krause, St. Louis. The new president, Buford Everett, Plattsburg, was unable to be present

Left: A moment's relaxation is enjoyed by (l. to r.) E. E. Trenary, Trenton, Mo.; Arthur R. Alvis, Butler, Mo.; and J. J. Griesemer, Billings, Mo. Right: Robert Koch, secretary, National Agricultural Limestone Institute, was the luncheon speaker. Horace Krause, St. Louis, is at left, and Charles Thomson, Kansas City, and Ben P. Donnell, Bonne Terre, are at the right

of the new law, reading from the thick volumes of Sec. 111 and 114 of the tax code. The Treasury Department wants to write new processing regulations for the 56 new industries permitted depletion allowances. Section 114 defined the term "mining" and included processing steps, but these would not apply to all the 56 new industries. Mr. Krause read a tentative list of steps involved in processing agstone, containing some 40-50 operations. This list will eventually be given to the Treasury Department. Promulgation of a new regulation then would involve redrafting by the department's legal staff in official language, then publication in the Federal Register. The proposed regulation then would be subject to challenge for 30 days, after which it would become an established regulation. It is quite certain, Mr. Krause said, that 10 percent will be the lowest depletion allowance granted the industry, but that thereis a strong possibility of obtaining 15 percent. The maximum 15 percent allowance would reduce costs 5-7 cents a ton, industry-wide, compared with $2-$3 in the oil and gas industry, he said.

Mr. Andrae discussed the mechanics of applying for depletion allowances and gave examples. Claims for the allowances can be made by the producer only if he owns or controls the mineral rights, he cautioned. If a quarry is rented, there is no obligation on the part of the lessee to tell the owner that he may claim depletion allowances. Mr. Andrae advised producers to keep proper records to be able to claim deductions.

The opinion prevalent during the discussion was that if in doubt about whether to claim 10 or 15 percent allowance, a producer should take the larger, on the theory that it is easier to move down than up. The government would most likely exact only an interest penalty rather than a fraud penalty if the B.I.R. ruled against the claim, if it was made in good faith, according to Mr. Andrae. Another point made in the discussion was that gross income does not include spreading and trucking income, though the law provides including 50 miles transportation if this is necessary for processing. In the case of a producer who has never sold at plant, the delivery of the material might be included as "first point of sale." However, this might work to the disadvantage of the producer for trucking cost would be prorated with processing costs in computing gross income.


THE BOARD OF DIRECTORS
OF THE
Missouri Limestone Producers Association
Certifies that PAUL N. DOLL
IS A MEMBER OF THE
MISSOURI 100 TON CLUB
Signifying That He Has Spread 100 Tons, or more of
AGRICULTURAL LIMESTONE
On His Farm in CALLAWAY County, during 1951
President of the Board
SECRETARY Manager of the Association
Limestone Producer
"LIME IS A LIFE LINE OF HUMANITY"

The association makes these certificates available for producers to give to customers who have purchased 100 tons of agstone. Paul Doll, association secretary, proudly displayed the one he just received for spreading agstone on his 134-acre farm

O.P.S. Regulations

Paul Doll concluded the legislative discussion by reminding all producers that they must file price information with O.P.S. The question was asked whether spreader bed trucks are controlled under O.P.S. regulations as are contract haulers. State law specifically exempts agstone trucks from public utilities commission control. However, the O.P.S. doesn't recognize that fact in determining its control, which makes it necessary for a producer to obtain a decision from the local O.P.S. office whether his trucks are contract or common carriers.

National Report

Speaker at the luncheon was Robert M. Koch, secretary, National Agricultural Limestone Institute, who told of the new merged agstone association and its goals. A promotion and education committee to be formed will be one of the most important in promoting the sale of agstone. Mr. Koch's activities will include testifying before the Senate appropriations committee to prevent ACP funds from being cut to $185,000,000 from a scheduled $256,000,000. The 1953 authorization, even though set now at one figure, may be changed next year depending upon the new Congress this fall.

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(Continued from page 79)

ished car, on producing fuels and lubricants and constructing and maintaining highways, an amount equal to about one-eighth of our normal peacetime national income.

Mr. Barker described his mud theory of road construction: wherever the mud was worst, highway building was pushed ahead with greatest vigor. Wherever the mud was the least troublesome, highway development was retarded the longest. That is one reason why Illinois has been a leader in financing and carrying out a comprehensive network of all-weather primary highways, he added. In 1918 the first bond issue act was passed, and in 1924 the second bond issue act followed. These two acts financed a state network of about 10,000 miles of roads. By the end of 1928, almost 6000 miles of highway had been completed.

World War II intervened in the construction programs, and prevented any major work completion. At the same time, weight restrictions on trucks were waived in the name of national defense, further deteriorating the highway system, the speaker said. At the end of the war, most of the department's activities were devoted to recovery. But the importance of the highway to the nation's well-being had been demonstrated to the extent that Mr. Barker felt "that it would be fair to say that what we formerly considered to be the three material necessities of life, food, shelter and clothing, has now been changed to food, shelter, clothing and automotive transportation."

In speaking of what lies ahead, Mr. Barker said that the state legislatures have long been concerned with highway deficiencies. During 1947 a special commission was established in Illinois to study this subject, and the "Griffenhagen Report" has resulted. In explaining why some of the recommendations have not been adopted, the speaker said that it is the duty of the highway official to report needs, and it is the duty of the legislature and the public to decide what it is willing to pay for.

Illinois' needs are not unique, Mr. Barker pointed out, for an A.A.S.H.O. survey last year showed that the aggregate of needs for the three federal-aid systems is $22 billion, of which about half is on the primary system and the remainder divided about equally on the secondary and urban systems. One state has reported needs of over $3 billion, one reported needs of over $2 billion, and six states reported needs of over $1 billion.

The order in which work is to be done is one of the greatest problems facing Illinois, as well as all other states, Mr. Barker pointed out. He estimated the state's obligation for immediate construction requirements on the primary system is close to $1 billion. Illinois is one of the states which has adopted the sufficiency rating system as a method of measuring the adequacy of each road to serve traffic. This objective rating system is now the standard procedure for programming rural road improvement in Illinois, and the highway department is now at work developing a similar rating system for city streets.

Bituminous Paving Mixtures

"Experience with Sand and Gravel in Bituminous Paving Mixtures" was the subject of a talk at the concluding session of N.S.G.A. by C. E. Proudley, chief materials engineer, North Carolina State Highway and Public Works Commission. North Carolina has pioneered in the development of low-cost bituminous pavements and has made widespread use of sand and gravel for the purpose.

Mr. Proudley reviewed early practices in the use of bituminous mixtures and described briefly the occurrence and the characteristics of aggregates in North Carolina. Sand in the coastal plain region is of rounded shape, and the shape characteristics become more angular as the Piedmont plateaus are approached. Some excellent deposits of sand are available through that area, but those in the Piedmont plateau itself and in the western mountain area are inferior. Few deposits in western North Carolina are acceptable for portland cement concrete aggregate, but they are often used in bituminous mixtures. Both sand and gravel and crushed stone are available for pavement construction.

Bituminous paving in the state has increased tremendously during the past three years due to the $200,000,000 bond issue voted in 1949. While most of the money is being used on the secondary road system, the program has influenced road building policies to the extent that many of the primary roads are using flexible types of bases and surfaces. All the mixtures are of the hot plant-mix type.

Sand-asphalt mixtures have been improved in many cases by the addition of coarse aggregates and a large volume of the present construction is classified as bituminous concrete of the dense-graded type. When resurfacing old concrete pavements, customary practice is to use a bituminous concrete leveling course topped with either sand-asphalt or bituminous concrete of higher quality. During the past three years, 9836.5 miles of hard-surface pavement have been constructed and the program is continuing.

As far as specifications are concerned, the points of control are the grading of the aggregate, the percentage of the bitumen, the characteristics of the bitumen and temperatures at which the materials are mixed and placed. For sand-asphalt, the grading of the aggregate is permitted to vary from job to job to take advantage of local materials.

From these mixtures, the specifications progress to coarser aggregate for both leveling course and surface course, the maximum size for surface course being ¾ in. and, for leveling course, 1¼ in. The highest type of pavement requires 25 to 45 percent retained between the ¾-in. sieve and the No. 4, with the balance of the grading to give a dense mixture with sufficient asphalt to almost fill the voids.

Due to the increased volume of work and heavier traffic density, studies are underway on the designs of bituminous mixtures for further improving the quality of pavements. Stability tests are continuing and skid resistance properties are given recognition. It has been noted that the use of fine aggregate having an excessive amount finer than the No. 40 sieve causes a slippery surface even under dry conditions. Studies are being made to evaluate surfaces on the basis of coefficient of friction. Samples are being taken of both good and bad pavements to determine why they are either good or bad.

Under the impact of increased traffic, it has been observed in some cases that there is shoving of the bituminous pavement ranging from slight waves to deep ruts. In many instances the bituminous pavement has broken loose from the base especially where there are rigid bases such as old concrete pavements. Another observation has been the existence of considerable amounts of water between the rigid base and the asphalt surface, where drainage conditions are unsatisfactory.

Traffic has about tripled in North Carolina since 1930 with increasingly heavier loadings. The load limit is now 18,000 lb. per axle and 58,800 lb. maximum gross load with appropriate number and spacing of axles.

As far as the use of sand and gravel in bituminous mixtures is concerned, Mr. Proudley said that no difficulty had been experienced which could not be traced to some other factor than the basic materials. However, he qualified by saying that the materials have contributed to some of the failures observed.

It is in the eastern half of the state where the aggregates are mostly rounded and almost 100 percent siliceous that least satisfactory performance has been observed, which has caused Mr. Proudley to give special consideration to those characteristics.

He reviewed briefly some of the observations on pavements made over the last five years. In most of the entirely satisfactory cases, the bituminous mixtures on sandy subgrade or base course materials were as dry as could be expected and there was no evidence of stripping whereas, in other cases built on old concrete bases or pavements there was free water on the concrete and in the bi-

tuminous pavement. These jobs were the least satisfactory.

Examination of asphaltic concrete pavements involving other than gravel and sand aggregates has revealed the same typical moisture and stripping conditions. Mr. Proudley believes that stripping of the asphalt from the aggregate would not occur if the moisture that accumulates between the concrete base and the resurfacing could be eliminated.

It is not known whether the cause of moisture accumulation is atmospheric, drainage, subgrade materials or other, but it is important to find the cause. Mr. Proudley theorized that the cause is subsurface moisture raised through the old concrete pavement by high capillarity or some such characteristic of the concrete which prevents retreat of the water.

Bituminous concrete mixtures are designed to have density to prevent water percolation but progressive stripping from the bottom upward, as observed in conditions of poorest performance, confirms the opinion that the water enters from below.

Experience with sand and gravel has been good with few exceptions. However, stability tests in the laboratory do not indicate a favorable comparison with crushed materials. As a result, for primary roads, it is specified that coarse aggregates be used in which at least 50 percent of the particles coarser than the No. 4 sieve have one or more freshly fractured faces.

OPERATING PROBLEMS

A FULL N.S.G.A. session for operating men was well-attended. These annual operating programs revolve around informal talks, by men within the industry, about new devices and ideas they have found useful in their work, or about new plants of outstanding designs.

The first speaker was Fayette J. Cloud, vice-president, W. R. Bonsal Co., Hamlet, N. C. Mr. Cloud told of the company's development and use of a well drill rig for prospecting for sand and gravel. Previously, the firm had tried digging pits by hand, and by orange peel buckets, draglines and power driven augers, but these were either too slow, too costly, or both.

The basis of the machine or drilling method is a rubber-mounted, lightweight well drill rig that was being exploited in the area for drilling water wells. It consists of a bucket with a cutting lip that is rotated by a small gasoline engine following somewhat the pattern of rotary oil well drilling. In the far West similar rigs of heavier construction have been used for drilling cesspools, wells, etc. Mr. Cloud said that, where the particle size of gravel is not greater than 5-6 in., holes can be dug with the machine to depths of 65 ft. or more.

The bucket, a large version of an ordinary earth auger, is provided with a valve, or flap, so that when the bucket is full the material will not run out of the opening when being withdrawn from the hole. It can drill inside steel or concrete pipe casings, in which event attempts are made to keep the casing a little ahead of the drill bucket.

The drill rods used are in 10-ft. sections with a square shank on one end and a square socket on the other. There is one 5-ft. length of square drill rod, which is used at all times as a part of the drill-turning mechanism.

For above water testing the machine drilled three holes for a total distance of 102 ft. in 6¼ hr. This included three set-ups and two moves, since the holes were about 1000 ft. apart. The 41-ft. overburden was a stiff sandy clay almost impossible to dig with a clamshell bucket. With two operators at $1.25 per hr. and the machine at $3 per hr., the cost was 32½ cents per ft., which included fuel, depreciation and incidental expenses. The machine itself cost $3100 but other items purchased brought the total cost to approximately $3500.

Geophysical Prospecting

A second paper on exploration was presented by Otto S. Conrades, president, St. Louis Material and Supply Co., St. Louis, Mo. Last year at the New Orleans meeting of the National Sand and Gravel Association a speaker at the operating session told of the possibilities of using the resistivity method for prospecting for sand and gravel, which method is one phase of geophysical prospecting. Mr. Conrades procured resistivity instruments and made a survey of 30 acres adjacent to the Merrimac river in the St. Louis area. He followed up the electrical survey by actual digging.

By means of slides, Mr. Conrades showed that prospecting by resistivity methods was, in his case, remarkably accurate. He described the deposit as being on limestone bedrock, with gravel from 10 to 25 ft. with finer gradations nearer the surface. There was 3-16 ft. of silt overburden and the deposit was approximately 30 percent sand and 70 percent gravel, with a silica content in the 90 to 97 percent range. Mr. Conrades pointed out that this high silica content was important since it was related to its electrical conductivity.

Mr. Conrades said that resistivity testing is accomplished by the introduction of electrical currents into the earth under controlled conditions through terminals driven into the earth. The distance between terminals is usually about three times the anticipated depth of measurement and, in this case, were 120 ft. apart. For deeper exploring the terminals are placed further apart.

The speaker pointed out that when electrical current is introduced into the earth there develops a flow of current in a pattern which might be described as the lower half of a watermelon. The electric current dips downward attempting to make graceful curves, first through the earth overburden, then the sand and gravel, and then partially through the bedrock and back up through the outlet terminal.

To enable his audience to have a better understanding of the technique involved, Mr. Conrades explained some of the basic fundamentals involved by saying that the materials through which the current flows easily are known as electrical conductors and the poor ones as insulators. Poor conductors are glass, silica, sand and gravel, quartz, porcelain and plastics. Good conductors are copper, most metals and carbon. Between these extremes are many other materials which permit the flow of electricity but in such degree that they serve neither as conductors or insulators, the speaker explained. Earth overburden is in this group. Sand and gravel are classed as insulators and the bedrock or limestone below as a fairly good conductor of a lower resistance.

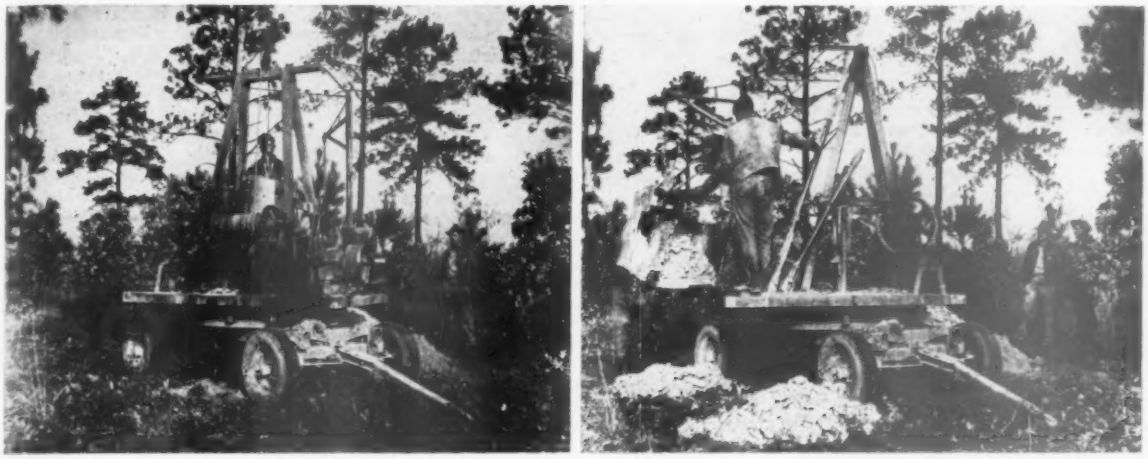
Mr. Conrades showed slides which demonstrated the general pattern of the flow of electricity through the terminals. By means of instruments the resistance of the various strata could be plotted and calculations made showing the depth of overburden, depth of sand and gravel, surface contours of bedrock, etc. However, Mr. Conrades explained, it does not enable one to differentiate between sand and gravel; the two must be lumped into one group. Before proceeding with the electrical installations some preliminary prospecting was necessary. This was accomplished by mechanical boring.

The speaker said that the 30-acre survey cost about $10 per acre, and that contours were obtained at 50-ft. intervals. Mr. Conrades thought that the resistivity method was a quick and economical method to make a preliminary survey of gravel deposits, to get a rough idea of the nature of the stratifications.

In the discussion that followed it developed that water did not affect the method—in fact the deposit surveyed by Mr. Conrades was such that the gravel and sand were completely submerged. He said that rock thicknesses could be determined by the use of the resistivity method and that clay seams or stratas could be located.

1000 t.p.h. Gravel Plant

R. K. Humphries, vice-president and general manager of Pacific Coast Aggregates, Inc., San Francisco, Calif., presented a paper on "The Construction and Operation of a 1000 t.p.h.



Well-boring machine adapted to rapid sampling of sand and gravel deposits described by F. J. Cloud, W. R. Bonsal Co., Hamlet, N. C. Left: General view of light portable rig which is an adaptation of water well drilling technique. It is powered by a small gasoline engine and flat belt drive (right). Right: Dumping the bucket; a cutter lip on the bucket augers into the hole and by means of a flap made from old belting, the opening tends to seal itself when not rotating

Gravel Plant." This is the Eliot, Calif., plant of the company, where 32 conveyors and seven surge piles are featured. Mr. Humphries gave his audience an inkling of this operation, along with the showing of many colored slides. ROCK PRODUCTS, February, 1951, issue, page 86, described the plant in considerable detail.

Mr. Humphries said that for engineering design and layout they turned to The Conveyor Co. of Los Angeles and Allis-Chalmers Manufacturing Co. of Milwaukee for the checking of equipment to be installed.

Soon after beginning construction of the Eliot plant, said Mr. Humphries, they found it necessary to build two more producing plants, one of 500 t.p.h. capacity and one of 300 plus per hr. capacity, plus four distributing yards composed of ready-mixed concrete plants, warehouses and dry material bunkers. These were designed and built by the company without increase in managerial or supervisory personnel.

Mr. Humphries said that his firm was convinced that the new Eliot plant would have to encompass the following:

(1) It must be of steel and concrete construction; their experience with wood construction had been bad due to the constant rotting and replacement condition. They further felt that millwright personnel were becoming non-existent and that cutting torch and welding rod were replacing the saw and hammer.

(2) The plant must have more adequate wiring; it must all be in conduit and underground wherever possible. Control boards and switches must be centrally located so that one man could control them. It must be easily accessible for trouble shooting.

(3) All screens, crushers, motors, head and tail pulleys must have more than adequate head room and be easily accessible from all sides. Floor plans and the placement of equipment must be so designed and installed to provide for unit replacement as quickly as possible.

(4) The plant must produce a high quality product so far as gradation and cleanliness are concerned. It must screen to a maximum number of sizes permissible with the material of the deposit, and it must recombine these sizes to meet specifications by mechanical blending. It must split sand for blending purposes into four sizes; ¼-4 mesh, 4-8 mesh, 8-16 mesh, minus 16 mesh.

(5) It must provide for a minimum of hand stockpiling of finished material, and must provide a maximum amount of semi-finished material as a substitute for finished stockpiles.

(6) It must have a loading capacity of 1000 t.p.h. and must be able to operate efficiently and profitably on greatly reduced tonnages as a result of market fluctuations.

(7) It must be adaptable to expansion when and if required at a minimum of cost.

To detail these requirements on paper took the better part of 1944 and 1945, and construction began in March, 1946. Mr. Humphries said that the company acted in the role of the general contractor and undertook to place all equipment, to fabricate and erect all chute work, and to comply with all safety requirements. It subcontracted concrete structures and footings, steel fabrication and erection, and all electrical work.

The long strike of Allis-Chalmers at the time delayed delivery of all screens and crushers by six months, and the steel strike and acute shortage of detail engineering personnel also delayed final drawings. Mr. Humphries said that if there are any lessons to be preached to those who are starting to build or are planning to do so they are:

"(1) Get all the engineering help possible—from your own organization, from outside sources, from equipment suppliers—not from just one, but from all.

"(2) Match and compare this data with your operating experience and those of other operators, either through observation or direct contact. In each of these cases I believe contact with our friend Stanton Walker, of this association, can be of great value.

"(3) Analyze all of the machinery and equipment you intend to use in the greatest detail. Not just that equipment you are in the habit of using or know most about—look over the field—there have been some changes made. Attendance at shows such as we have here at this convention offers great opportunities for just this sort of thing.

"(4) Place your orders; obtain firm delivery dates with penalty clauses.

"(5) Construct the first items of operation with all possible speed—leaving much to be built in later after limited production has begun. This is most important. There will be changes but get into operation first and leave units which you can temporarily do without until after you are producing. Remember you are building for use, not just to be building!"

Plant Details

Mr. Humphries gave a few statistics relating to the Eliot plant. It required 4000 cu. yd. of concrete in bunkers, footings, foundations, tunnels and pull boxes; 1300 tons of fabricated steel in conveyor trusses, floor decking and superstructures; had a 3000-hp. connected load; 3.6 miles of conveyor belt; three 3-deck screens (one 5 x 12 ft., and two 4 x 4 ft.); 17 two-deck screens (4 x 4 ft.); and no single-deck screens. All screens were manufactured by Allis-Chalmers.

All equipment is interlocked electrically so that if one piece stops all equipment feeding the stopped equipment will also stop. This is indicated by lights on a panel board at the control station for the various units. A telephone system is used throughout.

Four thousand g.p.m. of water are pumped from deep wells, a portion of which is reused at the scrubbing plant so that actually 6500 g.p.m. are used for washing the material. This system included 4500 ft. of fresh water piping and 5400 ft. of waste water piping. The plant covers 21 acres with 69 additional acres for spur tracks and storage area. Storage includes 120,000 tons of material in tunnel piles when full and 5000 tons in 20 compartments of bunkers.

In describing the scrubber unit, he said the primary washing of the material is done in a Hendy trommel-type, 8- x 30-ft. blade mill, or scrubber. This equipment was formerly used in the production of concrete aggregates for Shasta dam.

Water for washing the material in the scrubber and on the screens below is furnished by a Peerless pump rated at 2000 g.p.m. at a head of 200 ft., driven by a 125-hp. motor, and a Byron-Jackson pump of the same capacity. The water used at the scrubber unit is water that has already been used for washing the material at the screening plant and has been allowed to settle in the settling ponds.

The water from the scrubber and the screens below goes to the sand classifiers and dewaterers and then to a Fairbanks-Morse sludge pump having a rated capacity of 2000 g.p.m. at a head of 75 ft., and a Kimball-Krogh sand pump of the same capacity. These pumps pump the water and silt to one of the worked-out pits.

The first screen below the scrubber splits the material into three sizes, all material larger than 4 in. being crushed in an Allis-Chalmers 6N gyratory crusher. This crushed material and gravel larger than 2½ in. goes to the crushed rock storage piles, he said.

Material passing the lower deck of the above screen goes to two screens, which again split the material into three sizes. Material passing the bottom deck of these screens is classified as sand. This material, with the water from the scrubber and screens, goes to three sand washing and dewatering units—a vacuum sand dewatering wheel and belt drag manufactured by Conveyor Co. and a Dorreo bowl classifier.

From the ½- x ¼-in. material storage pile, a conveyor brings the material to an 8- x 12-ft. Marcy rod mill. In this mill the material is ground down to sand. Any material larger than the sand size required is returned to the mill. Material passing the screen goes to the sand dewatering equipment.

The speaker described the storage piles and tunnels by saying that provision has been made for seven storage piles, six of which are now in use. Total material in these six piles when full is approximately 160,000 tons. The material in each pile is fed to the main conveyor belts by short belt feeders which are operated by remote control from the control station at the screening plant. The concrete tunnels under the storage piles are 7 ft. wide and 7 ft. high inside, the side walls vary from 10-14 in. in thickness, the roofs from 12-18 in. and the heavily reinforced floors from 15-21 in. Tunnel lengths vary from 80-120 ft. and two of the storage piles have two tunnels each.

The screening plant was also described by Mr. Humphries. It is erected over concrete bunkers 30 ft. wide, 150 ft. long and 40 ft. high, divided into 20 compartments of 250 tons each. Screening of minus ½-in. material, is done on six Allis-Chalmers screens. The first group of three screens is made up of double-deck 4- x 14-ft. Lo-Head screens, all of which produce the same sizes of material—½ x ⅜ in., ⅜ x ¼ in. and ¼ in. x 4 mesh. The minus 4-mesh material goes to the second group of three double-deck 4- x 14-ft. Ripl-Flo screens which also produce three sizes of material—4 mesh x ⅛ in., ⅛ x 1/16 in. and minus 1/16 in. All material except the minus 1/16 in. is dropped directly into the concrete bunkers below the screens. Provision is also made to bring sand direct to the bunkers by passing all of these screens.

Cone classifiers in a new sand plant in the Southeast similar to those described by E. A. Goodman, Jr., in his paper on water classification methods developed by his company for the retention of minus 50-mesh materials in concrete sand

The minus 1/16-in. material goes to a Conveyco vacuum sand dewatering unit where the excess water is removed and then into the bunkers. On the coarse screening side of the plant are four 4- x 14-ft. Allis-Chalmers Lo-Head screens in two groups of two each. The two upper screens produce 2½ x 1½, 1½ x 1¼, and 1¼ x 1 in. material; the two lower screens produce 1 x ¾, ¾ x ½ and ½ x ¼ in. material. All of these sizes go direct to the concrete bunkers below.

Gates under each compartment, operated by lever and cable controls, permit blending of any of the sizes produced by the screens onto the loading belt, which conveys the material to the loading station.

All material and water passing through the rinsing screens goes to a Wemco screw which dewaters the material, the water being flumed away and the material going to a pile at the loading station.

Mr. Humphries also described, with the aid of slides, the loading plant, the crushing plant for oversize rock (gravel) and methods for keeping the crushed gravel and the uncrushed separate. He also showed the loading facilities for trucks and the ready-mixed concrete batching plant.

In the discussion that followed it was pointed out that all the conveyors were on 16- to 18-deg. slopes and used greaseless rolls throughout. Mr. Humphries said that the shoes in the blade mill lasted a year and a half and that some preliminary washing was obtained by the reverse-feed chute to this mill. In this chute, which is lined with heavy steel rails, the incoming flow of pulp has its direction reversed sharply once before entering the scrubber.

A member from the floor asked about the mixing of four sands in the blending operation and Mr. Humphries answered that feeding to the belt continuously, loading and unloading appeared to provide sufficient mixing. He said that in the rod mill they were attempting to build up the 50-mesh sizes but that they could lose some minus 100 mesh in the set-up.

Sand Classification

E. A. Goodman, Jr., general manager, Lessees of B. V. Hedrick Gravel and Sand Co., Lilesville, N. C., gave a paper, "Classifying Sand to Maintain Optimum Percentages of Fines." The core of his paper was built around the use of Whirley-Cones, manufactured by the Cottrell Engineering Co.

The Whirley-Cone is a wet, cyclonic-type unit of small dimensions, about 24 in. in diameter and 6 ft. high. The

Left: (l. to r.) L. H. Woodward and Charles L. Woodward, Woodward-Pollock Lumber Co., Coldwater, Mich., and Fred M. Stewart, Consolidated Cement Corp., pause during their tour of exhibition hall. Right: Another informal discussion between, l. to r., Leon H. Wendel, Gasport Sand and Gravel Co., Lockport, N. Y.; George R. Krom, The Windsor Building Supplies Co., Newburgh, N. Y.; Frank L. Kelly, Colonial Sand and Stone Co., New York, N. Y.; John L. Gates, Metropolitan Sand and Gravel Corp., Port Washington, N. Y.; and Herbert D. Merrick, also with Metropolitan Sand and Gravel

pulp containing the fines is pumped into it and a pressure of 18-25 lb. maintained. Due to the centrifugal action in the cone, the fines are rejected at the lower apex. The liquid to solid ratio is such that the fines can be fed back to the plant's current production of sand.

ROCK PRODUCTS' August, 1950, issue, page 108, carried a full description of the first installation of this kind to be used in any gravel plant, the plant of Caudell & Johnson, San Diego, Calif. The Lilesville operation was the first plant east of the Mississippi river to install the device. (For further data on Whirley-Cones and other units of this type see the January, 1952, issue of ROCK PRODUCTS, page 127.)

Mr. Goodman said that his operation was using about 2700 g.p.m. of water and that production was in the 100-150 t.p.h. range. The pit-run material contains a considerable amount of clay so that the products have to be scrubbed twice in blade mills or rotary scrubbers. There has always been a deficiency in fines in the 50-100-mesh range. He said that the sand first was run with the total volume of water to a 19-ft. Wood Auto-Vortex bowl classifier to get a greater settling area for the fines. The discharge goes to a 30-in. x 25-ft. Eagle twin-screw dewaterer, which discharges to a belt for storage, to which fines from the Whirley-Cone are discharged.

The overflow from the screw dewaterer goes to a tank, from which a clamshell rig removes mason's sand. A portion of the tank's overflow is pumped to the cone classifier by a 5 x 4, type CW, Allis-Chalmers pump, which requires a 25-hp. motor. The lift is a net of about 20 ft. and a horizontal distance of about 15 ft. When the clamshell is not disturbing the pulp in the tank—an optimum condition as regards the cone classifier—the cone will produce 6-7 tons of minus 50-mesh sand per hr. The screen analysis of this product is as follows:

Passing No. 8	100 percent
Passing No. 16	99.9 percent
Passing No. 30	97.5 percent
Passing No. 50	57.7 percent
Passing No. 100	12.7 percent

Mr. Goodman indicated that one cone classifier will add approximately 4 percent to the minus 50-mesh material and 1 percent to the minus 100-mesh material for every 50 tons of sand produced.

In closing Mr. Goodman said that it had been his company's experience that a definite improvement in the strengths and workability of concrete is obtained when fines are added to the extent of 15 percent passing the 50-mesh screen and 3 percent passing the 100 mesh, but that addition of still more fines did not increase the improvement.

In the discussion, Mr. Goodman said he thought the cone was receiving about 700-800 g.p.m. and the feed had a 20 percent solids content. No minus 200 mesh was wanted in the product and the cone would work on feeds with 4-5 percent solids. A variable feed gives variable results, Mr. Goodman said, but a constant feed gives a constant discharge. The cost per ton is low, he said, and the cost of the unit is in the $1350 range.

LABOR LEGISLATION

"RECENT DECISIONS by the National Labor Relations Board which Affect the Sand and Gravel and Ready-Mixed Concrete Industries" was the subject of a talk before both associations by association counsel Charles A. Horsky. In his talk, Mr. Horsky reviewed recent decisions involving other industries but of direct interest to the sand and gravel and ready-mixed concrete industries, principally covering group bargaining by employers under the Taft-Hartley Act, secondary boycotts imposed by unions, the legality of collection of union dues and other subjects of particular interest.

He said that there has been no major shift in emphasis in the field of labor law since enactment of the Taft-Hartley Act, except for developments involving emergency agencies which were not the subject of this talk.

Subjects for discussion were given as illustrations of a continuing development, covering decisions of the National Labor Relations Board or of courts which determine the trend in thinking.

Group Bargaining

In the field of group bargaining, unions have been in a strategic position, he said, because they could apply pressures to the weakest member of a group and then present concessions gained as an area pattern in pressuring other members. If the trick fails, a strike against the one or two employers selected would not seriously drain the strike benefit fund or cause public clamor. Instead of employers being able to use the lockout of employment as a defensive maneuver against strikes, the National Labor Relations Board has practically eliminated the use of the lockout in labor disputes.

Under prevailing rules, an employer may discontinue or reduce operations for any reason unless action was motivated by a purpose to interfere with and defeat its employes' union activities. However, according to Mr. Horsky, this broad position of the N.L.R.B. has been successfully challenged in the courts this past year.

In the case of Morand Brothers Beverage Co., where members of an

association of soft drink producers locked out their employes when a strike was called against one member, the United States Court of Appeals reversed the decision of the N.L.R.B. which had ruled against the employers. The court said that as a retaliatory measure the members of the association "should be accorded the right to counter such a strike with a blackout, i.e., that they should have a right to meet economic pressure by the union with economic pressure exerted on the union." It further stated, "once the petitioner had exhausted the possibility of good faith collective bargaining with the union through their association, any or all of them were free to exercise their right to lockout without waiting for a strike, just as the union was free to call a strike against any or all of them."

While this decision is favorable, Mr. Horsky warned that producers should not feel free to take similar action because that decision is so inconsistent with N.L.R.B. thinking that the decision of one court of appeals will not change the rule.

In another case negotiations between an association of automobile dealers and the union had reached an impasse. The union struck the shops of two members upon expiration of the contract. Failing to get assurances from the union that they would not also be struck, all members but one closed their shops and laid off their employes. The lockout was ruled justified by the board on the ground that an employer is not prohibited from taking any reasonable measures, including closing his plant, where such measures are necessary for the avoidance of economic loss or possible disruption of his business. In this case, the employers were afraid that a strike at their auto repair shops would find them with customers' cars torn down.

The trend, said Mr. Horsky, is in the right direction, insofar as employers have more of a weapon to fight back when the union applies its "divide and conquer" technique, but he hopes that ultimately the Supreme Court will endorse interpretation of the act which permits something like an even battle. Until then, he suggested that producers exercise caution.

Secondary Boycotts

In his discussion of secondary boycotts, he said that the two industries suffered a serious defeat when the N.L.R.B., about two years ago, announced jurisdictional limitations which it would apply to itself in all types of cases and which excluded from the operations of the act a multitude of relatively small concerns. Recently, however, there has been indication that the courts may afford some relief from that strict application by the board of its jurisdictional limitations. A federal court of appeals in Chicago reversed the board in refusing to proceed in a clear case of illegal secondary boycott. In this case, a union rule had prevented the use of pre-glazed glass and members of the glazers' union refused to work on any jobs using such materials unless it was removed and open sash substituted, or unless the contractor would pay the union a fee equal to the glazer's pay for any buildings using pre-glazed sash.

The board dismissed the complaint of the association of contractors, subcontractors and material men on the grounds that the operations of the employers were local. The court of appeals reversed the ruling.

As far as the Taft-Hartley Act is concerned, a distinction is made between two types of boycott, said Mr. Horsky, one is legal and one is illegal. A boycott directed at and affecting the employer with whom the union has the dispute—the primary employer—is proper. On the other hand, a boycott directed at and affecting an employer neutral to the dispute is improper, if it is designed to force him to bargain with a union where none has been certified, or to deal with other than a certified union, or to force an employer to cease doing business with another person or cease using or otherwise dealing in the products of another person.

Mr. Horsky pointed to a few examples to illustrate the fine line to be drawn in specific cases. Indirect pressures on employers apparently are not improper but union pressures upon employes of other employers than the prime employer are illegal. Numerous cases were cited where the Taft-Hartley Act has been effective and where employers have obtained substantial relief. There is much confusion and Mr. Horsky hopes that if and when the Labor Management Relations Act is again given a legislative working over that we will get a better and clearer statute.

Since the amendment to the Taft-Hartley Act, eliminating the necessity for a union-security clause election, if 30 percent of the employes file a petition alleging that they do not desire to be bound by such a clause, the board will hold an election to see if the union's authority to negotiate such a clause should be eliminated.

As to payment of union dues and assessments, Mr. Horsky reminded that under the Taft-Hartley Act a union shop clause may permit the discharge of the employe at the request of the union only if the employe does not maintain union membership in good standing because of his failure to tender "the periodic dues and the initiation fees uniformly required as a condition of acquiring or retaining membership." During the past year, the board, in many cases in which union shop clauses have required that membership and good standing be contingent on payments, has held such clauses invalid. Many specific cases were mentioned.

Union Bargaining

Speaking before a joint session of the N.S.G.A. and N.R.M.C. associations, Vernon E. Lohr, California Materials Co., Whittier, Calif., covered the subject of "Area Bargaining in Southern California." Mr. Lohr is chairman of the collective bargaining committee of the Southern California Rock Products Association and the Southern California Ready Mixed Concrete Association.

He described the problem of labor relations as one of union pressure and management's resistance to that pressure and, in telling of his committee's attempt to reduce the pressure and strengthen the resistance, he gave the background and functions of the labor relations committee, covered the subject of area practice and discussed the union demands in recent negotiations.

Some 18 rock and sand producing plants and 49 ready-mixed concrete operations are operated by 18 concerns in the Los Angeles area and comprise the membership of the two local associations. The A.F.L. unions involved are the operating engineers, teamsters and machinists and two plants, in addition, have the laborers and electricians.

The first formal labor contract was negotiated in 1941 at a time when the unions made capital of unsettled employment conditions in the defense program. Later they made excessive demands to the War Labor Board and the board's decision in 1944 included rate increases and one and one-half years of retroactive pay.

During this period, the companies themselves were handling the negotiations, and it soon became apparent that a well-balanced labor relations committee was required to cope with negotiators specializing in labor negotiations.

Labor Relations Committee

The labor relations committee, as appointed, is a permanent group consisting of six men of whom five, in addition to the recording secretary, are active members. The composite experience is broad; one member is chief engineer of his company, another has legal background, a third is widely experienced in industrial relations, and transportation, sales, production and public relations are represented in the personnel.

Practice is to open negotiations early, to take full advantage of the 60 days prior to the date the contract expires. During the negotiating period, close contact is maintained with the associations and the industry legal counsel, but legal counsel is never brought into direct contact with the unions. Separate meetings are held with each union and they are not

brought together until a settlement seems likely.

The committee functions in negotiations, in contract administration and in handling grievances. Questionable matters confronting member companies are referred to the committee as a policy, as a means to prevent unions establishing precedents with individual companies. The fact that men are brought together to work as a unit has been a strong factor in establishing employer unity which is considered one of the strongest points in labor relations.

For 12 years southern California has been a defense area and, according to Mr. Lohr, 10 percent of all federal employes are in California. As a result the area has been in a strong competitive labor market with labor recruiting and stressing high wages and all the fringe benefits.

When World II ended, much of the great labor pool stayed in southern California where it expected postwar industry to provide the conditions enjoyed previously in defense. When conditions leveled off in 1948-1949, the push for "social benefits" was on. The industry had a three-week strike in 1949 over the fringe issue of paid holidays.

Effects of wage stabilization have exerted a strong influence on recent settlements, with many companies finding the permissible wage increases insufficient to settle their labor problems. A final settlement, where permissible increases were 9, 10 and 13 cents for the three unions, was made on the basis of 9 cents and six paid holidays. The rock and sand and ready-mixed concrete industries comprised one of the last in the area to grant paid holidays.

Among the union proposals that were avoided were the guaranteed 8-hr. day, control of leased equipment, a pension plan, a union controlled health and welfare plan and a re-opening for wages once during the contract year.

The matter of union controlled health and welfare funds has been found an issue complicated to negotiate. The spread of such plans has been rapid and Mr. Lohr cautioned that such plans be carefully investigated well in advance of negotiations in order to avoid pitfalls.

Union agreements for the industry in southern California provide for 40, 60 and 80 hr. of vacation for one, two and five year's employment, respectively; six paid holidays; limiting provisions on holiday eligibility; a grievance procedure; guarantee of eight hours of work after four hours; and a wage scale comparable with that for comparable work in the general area.

In conclusion, Mr. Lohr said that it is management's responsibility to resist union pressures. The alternative is further encroachment on management's prerogatives. Union pressures are expected to continue and he anticipates great emphasis to be placed on fringe benefits in the immediate future.

Officers and directors of Manufacturers Division. Seated, l. to r., are retiring chairman Ralph C. Johnson, chairman R. D. Ketner, past chairman Morgan R. Butler and Roy Wills. Standing, l. to r., are E. D. Stearns, W. A. Rundquist, Emil Deister, C. B. Laird, D. McM. Blackburn, J. C. McLanahan, E. M. Heuston, R. P. McKendrick and J. Dunn

State Associations

A luncheon was held for producers interested in state and district associations. H. C. Feraud, Southern California Rock Products Association, acted as chairman for the meeting, which followed the lunch. Over 50 representatives were present, and each introduced himself and told the activities of the association to which he belonged, or the prospects of organizing such an association.

Some of the high spots of the discussions are given here. Ray Warren, Western Pennsylvania Sand and Gravel Association, Pittsburgh, said he doesn't believe associations should take in all companies as members, but only the best. His association issues daily bulletins telling changes in specifications, load limits, legislation affecting members and any information of help to members. The association has taken a stand in fighting certain legislation, also, Mr. Warren reported.

The North Carolina Ready Mixed Concrete Association, according to E. F. Lewis, Greensboro, is only a few months old and is in quest of a paid secretary. Mr. Lewis said the association wanted to share the services of the North Carolina Concrete Masonry Association secretary, and asked the group if any other organization had any experience with such an arrangement. Mr. Feraud replied that he was unaware of any similar set-up, and doubted its advisability. Many state ready-mixed concrete associations have ties with building contractor groups, he added.

Mr. Feraud described the southern California association's activities in saving members much unemployment insurance expense. Their savings amounted to over $100,000 a year in the aggregate, accomplished by protesting claims against the members. One association employe handles this part of the activities. The association is popular, and its members' loyalty is reflected in their ability to withstand labor difficulties as a solid bloc, Mr. Feraud declared. The last strike in 1949 was a failure, he pointed out by way of illustration.

The technical committee of the association has earned the respect of specification writing boards, which consult it before any changes are made. The association, which also includes ready-mixed concrete producers, supervises the issue of a "fabricator's license" given by the city of Los Angeles to producers that prove they can meet the association's strict standards. In this manner, Mr. Feraud said, the work can be restricted to producers with efficient operations, even though they may not be members of the association.

E. A. Fehlig, Helena Sand and Gravel Co., Helena, Mont., wanted to know if the N.R.M.C.A. could produce instructional film on making quality concrete for the benefit of the small producer. Mr. Feraud suggested that the Portland Cement Association has a number available, and R. E. Hutchins, Wabash Valley Ready Mixed Concrete Association, said that Terre Haute Supply Co., 10th and Chestnut Sts., Terre Haute, Ind., has a color film on ready-mixed concrete production.

A. R. Shiely, St. Paul, Minn., suggested that at the next national convention, a general session should be held for state and district organizations and this will be done. The present interest has outgrown the small luncheon meeting, he said.

Mr. Warren reported on the new constitution and bylaws drawn up to aid new associations in their organizing stages. Bylaws of established associations were gathered together and incorporated in the model constitution. This was submitted to the national association as a guide, and copies may be obtained from the N.R.M.C.A. It was prepared only as a guide to be adapted to an organization's particular needs.

Manufacturers Division

Business affairs of the Manufacturers Division, N.S.G.A., were transacted at a luncheon meeting under the chairmanship of R. C. Johnson. V. P. Ahearn first spoke briefly about the exposition, plans for the 1953 convention and that to be held in 1954 with the biennial exposition. He expressed regrets that shortage of space prevented all manufacturers from having desired space. All manufacturers were invited to the 1953 convention in San Francisco, at which there will be no exhibit.

The manufacturers, even though many of them were in favor of an exposition in an outdoor auditorium in 1954, which was turned down, pledged their support in going along with the wishes of the producers.

R. D. Ketner, General Electric Co., Schenectady, N. Y., was elected chairman of the division. J. C. McLanahan, McLanahan & Stone Co., Hollidaysburg, Penn., and C. B. Laird, Eagle Iron Works, Des Moines, Iowa, were elected vice-chairmen. Vice-chairmen E. M. Heuston, Bucyrus-Erie Co., South Milwaukee, Wis., and R. P. McKendrick, Blaw-Knox Division, Pittsburgh, Penn., were re-elected.

The number of directors, exclusive of the chairmen, was increased from 11 to 12, including the vice-chairmen. New members elected were Emil Deister, Deister Machine Co., Fort Wayne, Ind.; J. E. Dunn, Allis-Chalmers Manufacturing Co., Milwaukee, Wis.; and A. K. Thomas, Chain Belt Co., Milwaukee, Wis.

Re-elected were D. McM. Blackburn, Hendrick Manufacturing Co., Carbondale, Penn.; J. B. Bond, Nordberg Manufacturing Co., Milwaukee, Wis.; W. A. Rundquist, Pioneer Engineering Works, Minneapolis, Minn.; E. D. Stearns, Barber-Greene Co., Aurora, Ill.; and Roy Wills, Lima Shovel & Crane Div., Baldwin-Lima-Hamilton Corp., Lima, Ohio.

Equipment Displays

The machinery exposition, which was the largest and finest in the history of the associations' conventions, overflowed the hotel exhibit hall into the exhibit hall lobby, the mezzanine and outdoor parking lots adjacent to the hotel. Approximately 100 manufacturers exhibited latest equipment and accessories for the two industries.

Each exhibit had available informative material such as catalogs, specifications and technical literature, in addition to attractive displays of equipment and products. Full size equipment was displayed whenever load limitations of the exhibit floor area would allow. Some of the heavier pieces were on display outdoors; otherwise, operating scale models and effective job photographs were used to illustrate the various points of each item of equipment.

Many of the displays and literature were specifically pointed at solving operating problems and also emphasized means of cutting maintenance costs and prolonging the life of equipment. In addition to major items of machinery, various types of accessories also received prominent attention.

Types of equipment displayed ranged from the large basic items to the smallest component part of each machine, replacement parts and tools. This included engines and power units, crawler tractors, various types of loaders, cranes, shovels, draglines, scrapers, wagons and trucks. Handling and processing equipment included conveyors and conveyor accessories, various types of feeders, classifiers and separators, washing equipment, and numerous types of screens. Crushing equipment was exhibited, also portable plants, pumps, steam generators, and asphalt plants and equipment.

Included among the maintenance and accessory parts of the exhibits one found such items as car pullers, winches, wire screens and cloth, belt fasteners and other accessories, hopper car unloaders, electric hoists, compressed air tools, engine heaters, electric motors and motor controls, ball and roller bearings, bins, steel flooring grates, lubrication systems, clamshells, buckets, vibrators and innumerable others.

Alert producers were able to get many worthwhile tips on operating problems from the literature and displays, such as use of electric hoists in dislodging crusher hang-ups, open steel flooring and stair treads for added plant safety, portable crushers, automatic lubrication systems for all types of industrial machinery, various types of sand classifiers, self-contained boilers for heating and processing material, and tank car heaters for producers who have entered the asphalt paving field.

Various types of feeders received considerable attention, as well as vibrating grizzlys, scalpers and screens. More than one manufacturer was featuring low-head horizontal screens and other screening features such as quick changing screen cloths and automatic screen cloth tension, elimination of dead spots, etc.

Several of the newer innovations in screening included the Thermo-Deck heating unit for vibrating screens put out by Allis-Chalmers Manufacturing Co.; the electrical heating unit was designed to eliminate blinding of medium or fine screen cloth. Nordberg Manufacturing Co. displayed its new screen for fine materials that operates on the principle of centrifugal force, the Symons V screen. It consists essentially of a screening surface in the form of a vertical cylinder or drum, which is simultaneously rotated and gyrated. Various truck manufacturers had photographs and literature on large heavy-duty haulage units, some having as large a capacity as 20 cu. yd. or 34 tons. These were only a few of the many pieces of equipment displayed that pointed ways to efficient and cost-saving operations.

Employes Reject Collective Bargaining

SOUTHWESTERN PORTLAND CEMENT Co. employes at the Fairborn, Ohio, plant, recently defeated a union collective bargaining issue by a vote of more than two to one. Out of a possible 281 men eligible to vote, 270 appeared at the polls, of which 185 voted against the union proposal and 85 in favor. The balloting was conducted by a National Labor Relations Board representative. A company representative and a union representative were also present.

Refractory Dolomite

THE DEFENSE MATERIALS PROCUREMENT ADMINISTRATION recently announced an agreement with Basic Refractories, Inc., Cleveland, Ohio, to step up production of refractory dolomite. Output of dead-burned dolomite will be increased by 15 percent annually as a result of the agreement.

Basic Refractories and its subsidiary, Defense Project, Inc., plan to construct a new processing plant at Narlo, Ohio, which will have an annual capacity of 320,000 tons. Total cost of the project is estimated at $3,500,000 and will be financed, in part, by a loan of $2,625,000, of which 80 percent will be guaranteed by the government. The government will have priority on the plant's output during the 5-year term of the contract, but is not committed to buy any of the new production.

Limestone Plant

CONSOLIDATED CEMENT CORP., Chicago, Ill., recently began production of crushed limestone at its new quarry and plant at Paulding, Ohio. First operations were started in early 1951, when 550,000 cu. yd. of material were stripped from an area 250 ft. wide and 1700 ft. long. A portable primary crusher, a 1400-ft. conveyor belt system and loading hoppers have been installed. A freight car siding for loading operations was constructed by the New York Central Railroad Co. Crushed limestone produced at Paulding will be shipped to the company's cement plant at Cement City, Mich., for use in cement manufacture.

Australian Cement

AUSTRALIA REPORTS indicate a severe cement shortage. Large quantities of cement are being purchased from Japan at nearly four times the price of locally produced cement to help meet Australian requirements.

Underground Mining

(Continued from page 87)

droquinone. The exhaust gas is directed to the bottom of the unit by a baffle at the end of the tank. The gas passes through a 7-in. diameter hole in the false bottom of the scrubber. A 12-in. diameter solid area above this hole helps distribute the gas uniformly through a perforated plate. Two 10-mesh screens spaced above the perforated plate reduce the mechanical entrainment of the scrubber solution in the exhaust stream. A test of this scrubber mounted on a truck powered by a diesel engine showed 50 to 85 percent removal of the aldehydes, depending on operating conditions.

Crushing Plant

The dolomitic marlstone has a great tendency to break into flat and elongated particles and these, as well as the fines, are objectionable in the subsequent processing so efforts have been made to reduce the amount of flats and of the minus ⅜-in. stone.

The preliminary crushing plant consisted essentially of a 36- x 42-in. Blake-type double-toggle primary jaw crusher, a 10- x 30-in. secondary single-toggle jaw crusher, a tertiary gyratory crusher, and auxiliary conveying, screening and storage equipment. A flow diagram is shown in Fig. 8. Three product streams of different particle-size ranges may be delivered by the plant simultaneously. The plant can produce coarse material, up to 6 in., material as fine as minus 3/16 in., or particle sizes within this range.

Notable operational improvement was achieved when curved-jaw plates were installed in the primary crusher in place of the straight ones formerly used. The new plates, curved at the lower ends—one convex and one concave—make use of the bellhead and concave principle employed by gyratory crushers. Since the curved-jaw plates have been in use, breaking of the shale into troublesome slabs has been much less pronounced.

Other improvements in the crushing plant consisted of the addition of Fairbanks Morse weighing facilities to obtain accurate crushing data, including complete material balances.

Under a cooperative agreement, a 24- x 20-in. Jeffrey Flextooth crusher was being tested to determine the suitability of this combination high- and low-speed Flextooth rotor-type crusher for crushing oil shale preparatory to retorting. The machine now serves as the secondary crusher in place of a 10- x 30-in. jaw crusher used in the preliminary plant set-up.

Thus far, the experimental work indicates that, with increasing rotor speeds, higher production rates are obtained but, at the same time, the proportion of fines increases. Also, the tests have demonstrated that this type of machine is more effective in breaking up slabs of oil shale than the previously used Blake-type secondary jaw crusher.

Personnel

Emery M. Sipprelle was in charge of the bureau's oil shale mining branch from the middle of 1948 until the fall of 1951, with Fred D. Wright as assistant chief and Homer J. Ballinger as mine superintendent. Earlier work at Rifle was under the direction of E. D. Gardner and Tell Ertl. Herbert L. Teichman was physicist until the fall of 1950 when Robert H. Merrill took over this phase of the work. Charles K. Rose is now in charge of the Oil Shale Mine Branch and is assisted by Stephen Utter. Boyd Guthrie is chief of the Oil Shale Demonstration Branch.

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Missouri Producers

(Continued from page 98)

A survey was taken of 10,000 farmers in Illinois and 10,000 in Virginia to check their attitude towards the ACP. Strong support was indicated; many wanted the program expanded, Mr. Koch reported. The American Farm Bureau Federation last year recommended a cut to $156,000,000, and last year more Farm Bureau members voted in favor of the ACP than did nonmembers. Results were similar in the latest survey. As a result, N.A.L.I. phrased a letter to Farm Bureau officers asking why it took a stand evidently unfavored by 75 percent of its members in Illinois, Iowa, New York and Virginia.

Mr. Koch attempted to correct the mistaken impression that P.M.A. county committees can set fair prices to agstone producers. This is illegal without the committee calling for quotations from all producers, he said. Once a price is agreed upon, any producer can supply material at any time at the set price. The fair price must be posted in the county office, as must all the bids. There should be nothing confidential in the process, Mr. Koch pointed out. The speaker concluded his talk with the prediction that the government agricultural support program will be with us for a long time. Though it may vary in extent and receive temporary set-backs, he feels that it will not be dropped completely.

Highway Aggregates

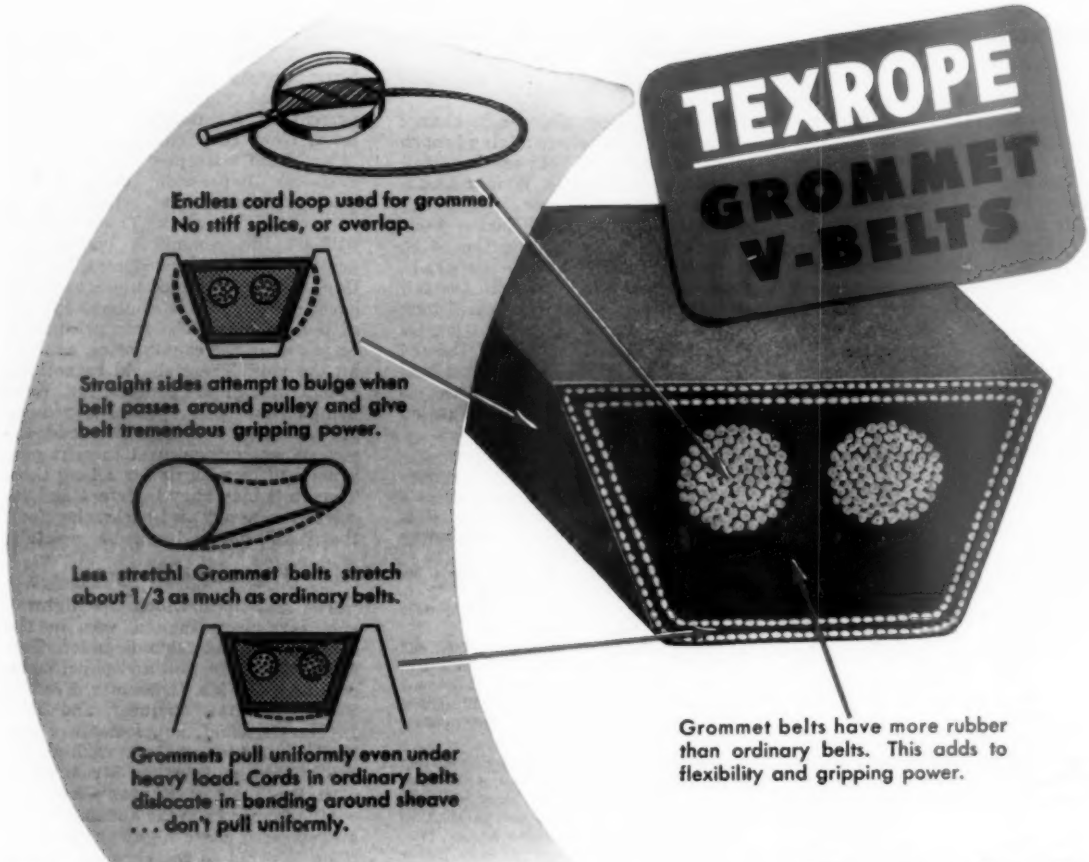
The session to which the highway engineers were invited was in the form of a round table dicussion. Presiding was Paul Doll and panel members included Mr. Griesemer, Fred V. Regal, materials engineer, and Fred D. Harris, chief, supplementary and local roads, both of the state highway department, and Arthur Strane, Midwest PreCote Co., Kansas City.

Mr. Krause from the audience asked Mr. Regal if state highway specifications referred to the chemical nature of aggregates, e.g., by limiting amount of chert, mentioning silica or any other chemical compounds, either by inclusion or exclusion. Mr. Regal answered that specifications exclude the presence of argillaceous material and chert but ordinarily do not define exclusions chemically. He promised to look into the matter more fully.

Considerable discussion centered about the mechanics of the King bill, which provides funds for supplementary and local roads. Such items as restrictions, bids, aggregate size changes after bidding and methods of letting bids were covered.

Specifications for asphalt roads were mentioned by Mr. Regal. These roads are critical in design, he said, requiring 3 percent voids after compaction. The sensitivity to gradation is such that the state provides a broad specification spread, then requires the contractor to furnish a trial mix. The state highway department then tests the density and suggests any aggregate size changes, if needed.

The highway department does not give aggregate producers an estimate of anticipated needs as it does to cement companies because the latter supply is fixed and localized. Furthermore, it was said, this information is confidential, for if it were to leak out the highway department would be under many sorts of pressure from the public, especially if a projected road were not built.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Rocky's Notes

(Continued from page 53)

1902. However, after several yearly debates and discussions, the lime industry abandoned this dream of solving its problems, and by long, often hesitating but ever persistent steps did succeed in solving them by cooperation, retaining individualities. We are glad they did it this way because we think that is, or at least during most of our lifetime it was, the typical American way of doing business. Moreover, it had the advantage of developing unforgettable, rugged characters, and not mere big corporation "yes men." It may have been the hard way to attain prosperity, but it sure was the most entertaining way—for a spectator and reporter.

Labor Relations Trends

(Continued from page 55)

be given retroactive effect to bar an election.

"A second contract pleaded as a bar to the election was made between the employer and a group of A.F.L. unions including the intervenor. This contract was executed 14 days after the petition herein was filed.

"The third and last contract urged as a bar is a current agreement between an employer association of which the employer is a member and the intervenor. This agreement contains a clause which prohibits employment of any but 'members in good standing' of the participating unions, when possible; it also provides that nonunion employes may be hired when union members are not available, but that such employes are required to join the appropriate union 'in the time and manner prescribed by the constitution of such union.' The hiring preference accorded union members in this contract clearly exceeds the union-security limitations imposed by Section 8 (a) (3) of the act, and thereby renders the contract ineffective as a bar to a representation proceeding.

"Employes who spend minor portions of their time in performance of heavy duty mechanical work at construction sites and in gravel pits away from main repair shops are appropriately included in the same unit with employes who spend all of their time doing similar work at main repair shops since all these employes exercise the same skills and have similar interests and there is no clear-cut bargaining history requiring exclusion of outside mechanics.

"The only dispute is with respect to the inclusion of heavy duty mechanics at the employer's two gravel pits and a construction site away from the main repair shops. The maintenance work at the pits is performed by two or three mechanics sent out from the main repair shops; they spend about 30-40 percent of their time at the pits and the remainder in the shops. At the construction site, the employer has

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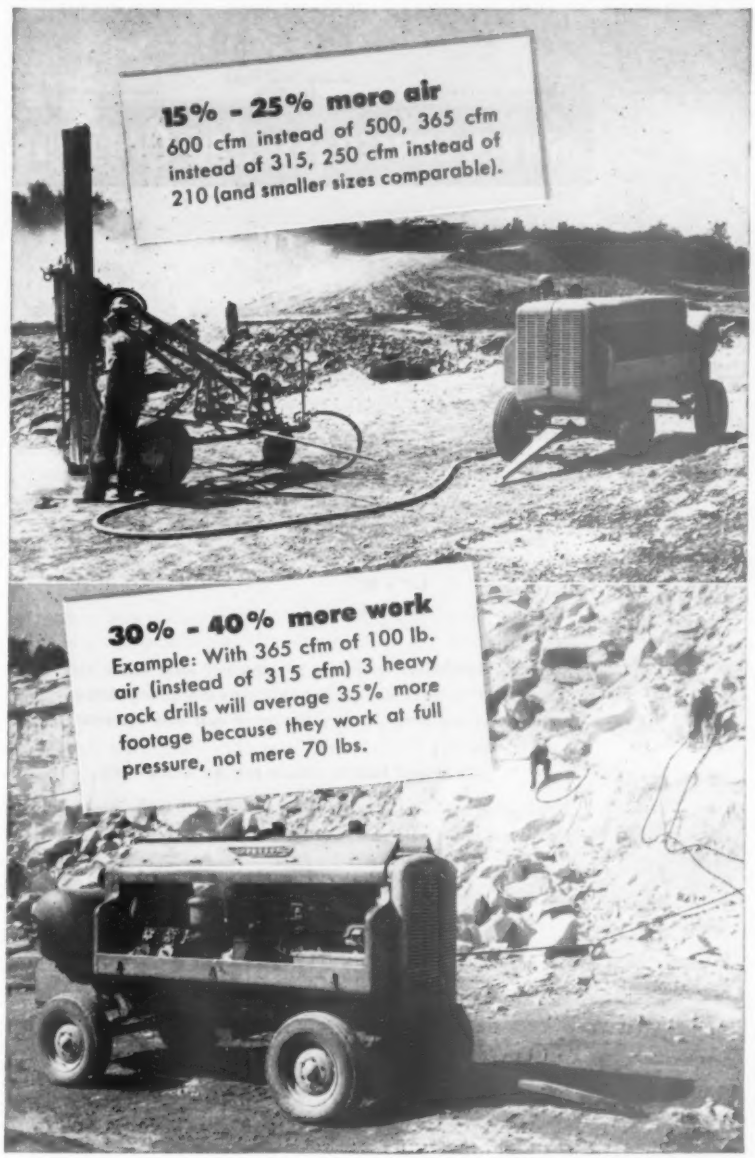
15% - 25% more air
600 cfm instead of 500, 365 cfm instead of 315, 250 cfm instead of 210 (and smaller sizes comparable).
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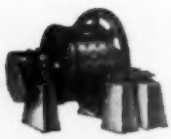
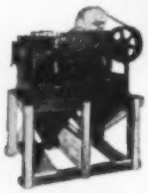
Denver-Dillon Vibrating Screens

Denver Ore Feeders



Denver Steel-Head Ball Mills

Denver Disc Filters



Denver Selective Mineral Jigs

DENVER FORCED FEED Jaw Crushers

Sizes:

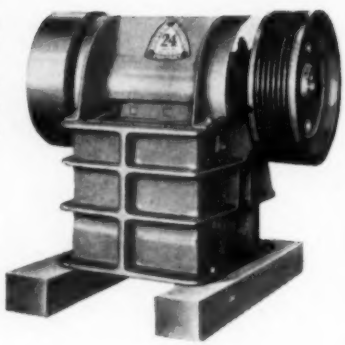
(Type "H"—anti-friction bumper bearings, bronze side bearings.)

2¼" x 3½"	8" x 10"
3¼" x 4½"	10" x 16"
5" x 6"	10" x 20"

Sizes:

(Type "J"—anti-friction bearing crusher.)

10" x 24"	18" x 36"
10" x 36"	21" x 36"
15" x 24"	21" x 40"
15" x 36"	25" x 40"
18" x 24"	32" x 40"



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Specifications: Cast steel or fabricated steel frame. Cast steel bumper. 13%-14% Manganese steel jaws and cheek plates. Forced Feed crushing action. Safety toggle of cast iron protects against tramp iron.

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Please write to us about your requirements. Quantity production of standard equipment means lower cost and good deliveries • Complete mill equipment from testing to feeder to dryer.

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ROCK PRODUCTS FEATURES TIMELY INDUSTRY NEWS EACH ISSUE

one full-time mechanic who is a member of the intervenor. In addition, two or three mechanics are sent out from the main repair shops from time to time, and when so assigned, spend about 10 percent of their time at the site.

"The record does not support the contention of the employer and the intervenor that past bargaining has established a fixed unit pattern excluding the outside machinists from the shop unit. At best, the various contracts received in evidence show that the employer has recognized both the petitioner and the intervenor as the representative of the employes performing repair work away from the shop.

Election Ordered

"Representation election directed, providing that intervenor's name shall be omitted from ballot if it does not renew its compliance with act within a two-week period.

"(Panel of Herzog, chairman, Houston and Murdock, members.)"

Clinker Grit

(Continued from page 93)

Means," ROCK PRODUCTS, September, 1940, page 52.

3. "Influence of Cement Particle Size on Strength of Concrete," ROCK PRODUCTS, May, 1951, page 88.
4. *Concrete*, Vol. 38, No. 4, page 16.
5. Larmour, H. McC., McMaster, E. L., and Jaques, William, "Evaluating a Pozzolan," ROCK PRODUCTS, March, 1941, page 52.
6. Bogue, R. H., "The Chemistry of Portland Cement," (1946), page 41.
7. Ibid., page 496.
8. "Coarse-Ground Cement for Experimental Road," *Cement and Lime Manufacture*, September, 1950, page 98.
9. Kornilovich, Abstract of an article (published in the *Russian Journal of Applied Chemistry*, 1948) given in *Cement and Lime Manufacture*, July, 1950, page 73.

Construction Predictions for 1952

MELVIN H. BAKER, chairman of the board of National Gypsum Co., Buffalo, N. Y., recently made some predictions concerning the outlook in 1952 for business and construction in general, and predictions for National Gypsum Co. in particular.

"The over-all construction picture for 1952 is not black," he declared. "I expect there will be a decline from last year's level, but the picture is far from gloomy, in spite of what some pessimists might say. A Korean truce would have little effect upon business since the defense effort would continue at approximately the present pace."

Concerning National Gypsum Co., Mr. Baker stated that there are two factors leading to optimism: first, the company's industrial business, particularly lime, is expected to continue at the present high rate, with greater emphasis being placed upon industrial and export business; secondly, remodeling and repairs should provide a stronger base than in the past, so that even if housing starts are held

down to 850,000, industrial business and the remodeling market, in addition to new home construction, should make National's business volume nearly equal 1951's record amount.

Mr. Baker predicted that housing will be off about 10-15 percent and other building classification off at least 25 percent, with over one-half of all construction in the first six months of 1952 concentrated in defense areas. "None of the materials we make are critically short now," he stated. "The oversold condition of the past few years is gone and now that production has caught up with demand, 1952's slightly reduced requirements ought to be met with but little difficulty."

Mr. Baker further predicted that the defense program's requirements of critical materials will begin to ease up noticeably by the end of 1952. "We can then concentrate on a further rise in our national standard of living. I see full employment and high wages in the years ahead," he stated. "In my opinion, we are entering the greatest era of mass purchasing power we have ever seen. The major pillar supporting that era will be the growth in population, now increasing at the rate of 2,500,000 per year, which will require that industry expand to meet the demand."

Mr. Baker concluded his predictions with the statement, "Good pay to workers is almost certain to continue and will in turn create the ability to buy the products of American industry."

Materials Handling Text

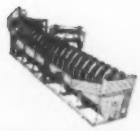
Industrial Materials Handling, Curtis H. Barker, revised and rewritten by Irving M. Footlik, Charles F. Yarham and J. Francis Carle, 371 pages, The Lincoln Extension Institute, Inc., Cleveland, Ohio, 1950.

THIS IS AN elementary text on materials handling, probably written for high school students. However, the book is comprehensive in its subject coverage. Practically all handling methods described relate to assembly and warehousing operations. Of interest to rock products and concrete products producers are chapters on conveying equipment and industrial fork lift trucks. The two minutes it would require to read about belt conveyors in the former chapter might be informative. Few operators will find much they do not already know or have available in technical manuals.

Seeks Dredging Permit

FLORIDA GRAVEL CO. of Chattahoochee has applied for a permit to dredge sand and gravel for commercial purposes in western Florida. The company proposes to dredge Apalachicola river from Flat Creek to the head of the river, and the Chattahoochee river from its mouth to the Alabama-Florida line.

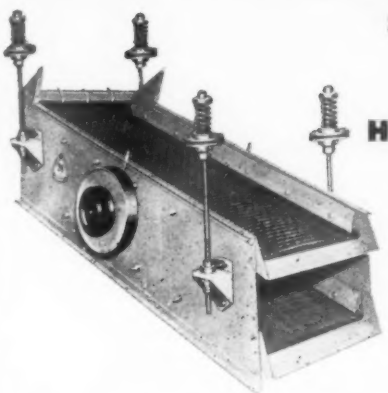
Denver "Sub-A" Flotation


Denver Cross-Flow Classifiers

Denver Hydroclassifiers

Denver Super-Agitator and Conditioners

DENVER-DILLON Vibrating Screens



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You save on initial cost, too, for this patented action eliminates unnecessary weight and fabricating costs.

Please write to us about your requirements. Quantity production of standard equipment means lower cost and good deliveries • Complete mill equipment from testing to feeder to dryer.

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Speeds Output Increases Profits for ROCK PRODUCT OPERATORS

Whether its moving shot rock, sand, or crushed stone, stripping overburden or charging bins, you'll find the "QUICK-WAY" in a class by itself in the ¼ to ½ yard field.

The "QUICK-WAY" features low center of gravity, works easily over the side, has proper balance for truck operation, gives you easy, fast swinging, plenty of reserve power, rugged all steel construction, numerous parts interchangeable. 4 models, ¼ to ½ cubic yard shovel, clamshell, dragline, backhoe, 3 to 10 ton crane capacity. Truck speeds to and from jobs. Low initial cost. Low maintenance costs. Eight different attachments.

With a "QUICK-WAY" you'll roll up yardage records hour after hour, day after day. Ask your distributor for a free demonstration or mail coupon.

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"QUICK-WAY" truck shovel, loading sand

"QUICK-WAY" crane with skull cracker attachment eliminates secondary shooting

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Please send me complete details on "QUICK-WAY" Truck Shovels —four different models from 3 to 10 ton crane capacity.

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City _____

Kiln Performance

(Continued from page 91)

Table I (Cont.)

No. 15: Heavy fuel oil—Mexico—"as received basis"

C	85.46 percent	LHV	17,259 B.t.u./lb.
H_2 available	10.60 percent		
H_2 unavailable	0	*Products of combustion*	
S	3.94 percent	CO_2	3.1312 lb./lb. = 27.10 cu. ft./lb.
O_2	0	SO_2	0.0787 lb./lb. = 0.454 cu. ft./lb.
N_2	0	H_2O	0.9473 lb./lb. = 20.00 cu. ft./lb.
HHV	18,260 B.t.u./lb.	N_2	10.5029 lb./lb. = 141.1 cu. ft./lb.

No. 16: Heavy fuel oil—Western—"as received basis"

C	86.22 percent	LHV	17,679 B.t.u./lb.
H_2 available	11.785 percent		
H_2 unavailable	0.125 percent	*Products of combustion*	
S	0.67 percent	CO_2	3.1591 lb./lb. = 27.00 cu. ft./lb.
O_2	1.0 percent	SO_2	0.01339 lb./lb. = 0.07725 cu. ft./lb.
N_2	0.20 percent	H_2O	1.06448 lb./lb. = 22.39 cu. ft./lb.
HHV	18,790 B.t.u./lb.	N_2	10.7778 lb./lb. = 144.9 cu. ft./lb.

No. 17: Light fuel oil—Mid Continent—"as received basis"

C	84.73 percent	LHV	18,051 B.t.u./lb.
H_2 available	13.36 percent		
H_2 unavailable	0.14 percent	*Products of combustion*	
S	0.37 percent	CO_2	3.1045 lb./lb. = 26.56 cu. ft./lb.
O_2	1.1 percent	SO_2	0.0074 lb./lb. = 0.0427 cu. ft./lb.
N_2	0.3 percent	H_2O	1.2064 lb./lb. = 25.42 cu. ft./lb.
HHV	19,312 B.t.u./lb.	N_2	11.0528 lb./lb. = 148.5 cu. ft./lb.

Equipment Distributors' Convention

THE 33RD ANNUAL MEETING of the Associated Equipment Distributors, which was held January 27-31, 1952, at the Conrad Hilton Hotel, Chicago, Ill., was attended by a record-breaking crowd of more than 2600 American and Canadian construction equipment distributors and manufacturers. Among those attending were top authorities from both government and industry. Topics covered in the four business sessions ranged from strictly association activities to distributor business problems, national affairs and the business outlook for the coming year. Projects for the coming year were also discussed. One project suggested was to publicize more the construction equipment industry, especially the methods of equipment distribution, and the importance of the distributor to the national economy.

During the first business session, four resolutions were adopted. The first was directed at both manufacturers and N.P.A., asking for balanced production of spare parts and new machinery. The second resolution was in opposition to public construction by force account and recommended that the contract method be employed on all construction by the federal government and all governmental bodies. In the third resolution, A.E.D. asked that Congress practice every possible economy in its domestic and foreign expenditures and eliminate all unnecessary programs.

In another resolution, A.E.D. recommended that CPR-105, enacted late last year without consultation with the construction machinery industry, be revised to more nearly coincide with the standard practices in the industry. Principal objections to the regulation were: the 90-day clause, which is contrary to industry practice; the method of figuring base price; the guarantee provisions of the regulation; lack of consideration of freight charges in figuring base prices.

These objections to CPR-105 were voiced to O.P.S. representatives, A. E. Loder and Leo Wasser, who expressed belief that CPR-105 would eventually be amended to more nearly conform with industry, but neither one would commit himself on how long it would be before any amendments would become effective, nor could they promise any immediate relief from the inequities of the regulation.

Other objections and questions were directed at N.P.A. representatives, M. B. Garber, who was making his last public appearance before retiring as director of the Construction Machinery Division, and C. J. Haring, his successor. Most of the questions revolved around the subject of priority. Both Mr. Garber and Mr. Haring took the stand that priorities should be deemphasized by both the manufacturer and the distributor. They held that priorities were merely safeguards to assure the ultimate delivery of machinery and were not a guarantee for faster delivery.

Among the speakers at the convention was Milton Rosen, past president of the American Public Works Association and commissioner of public works of St. Paul, Minn., whose address, "What's Being Done about the Threat to Highway Transportation?" brought attention to the highway crisis that is rapidly developing in this country.

Julian R. Steelman, president of C.I.M.A. and president of Koehring Co., Milwaukee, Wis., stated, "The tremendous basic importance of our roads and transport seemed undebatable. The necessity of rapidly clearing away the backlog of deferred highway improvement and maintenance accumulated from policies enforced during the [last] war seemed to be fundamental to preparedness as well as to a sound domestic economy. The first six months after the outbreak of fighting in Korea shook these concepts considerably, and the next six months shattered them completely."

Mr. Steelman, looking at the overall picture, predicted shortages of heavier construction material before the end of 1952, and a relatively balanced supply of lighter types of equipment. Heavy tractors, for example, would likely be in short supply, but small crawler and rubber-tired tractors would probably be easy to obtain for civilian use.

One of the difficulties, he said, was that D.P.A. had cut machinery production by about 75 percent, while construction, especially the heavier types, would equal the all-time highs of 1951, with defense building replacing residential construction.

Walter L. Couse, Walter L. Couse Construction Co., Detroit, Mich., past president of Associated General Contractors, surveyed the year ahead from the point of view of the contractor. Like Mr. Steelman, he saw increased activity in heavy construction and a corresponding decline in residential and private construction. He also expressed concern over the possible shortage of repair parts for construction equipment and added his endorsement to the resolution passed earlier calling for a balance of parts with new machinery.

Brigadier General Arthur W. Pence, assistant chief of engineers, military supply and equipment, Corps of Engineers, outlined the military plans for the coming year. He predicted a military construction program amounting to about $2.8 billion during the fiscal year of 1952, with a slight increase in 1953, which would be about the same yearly rate of construction undertaken by the Corps of Engineers during World War II. Approximately $165,000,000 worth of new equipment will be needed for Corps of Engineers projects.

Harry J. Hush, vice-president and secretary, Griffin Equipment Corp., New York, N. Y., was elected 1952 president of A.E.D., succeeding R. L. Arnold, Arnold Machinery Co., Salt Lake City, Utah.

Plant Destroyed by Fire

SUGAR CREEK BUILDING MATERIAL Co.'s plant near Sugar Creek, Mo., was recently destroyed by fire, with damages estimated at $25,000. The building, which contained equipment for quarrying and rock crushing, was completely destroyed and much of the machinery damaged. The loss included an elevator, two large power motors, two trucks, a high-loader, an air compressor, two rock crushers and wooden bins for storage of crushed rock, none covered by insurance.

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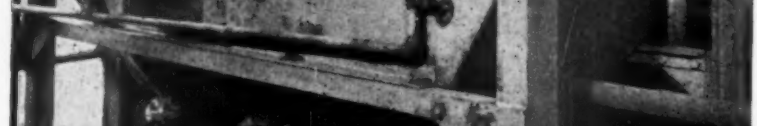

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AFTER completely satisfactory performance at the American Zinc Company plant at Mascot, Tenn., The American Cyanamid Company, as technical representative of the American Zinc, Lead & Smelting Company, has approved the STEARNS Type "MWI" Magnetic Separator for use in Heavy-Media plants. In operation in the Heavy-Media process in the concentrating of zinc ore, the STEARNS Type "MWI" Separator recovered better than 99.9% of the magnetic ferrosilicon.

The STEARNS Type "MWI" Magnetic Separator is equally adaptable for the recovery of media in Heavy-Media plants for the processing of all types of ores. This includes iron ores, fluorspar, rock products, coal, and similar materials. Specialized STEARNS Magnetic Separators are available for the recovery of other media such as magnetite.

Whether your problem is that of purification, reclamation, or concentration, STEARNS has a separator for you. From the fairly simple job of tramp iron removal to the concentration and beneficiation of complex ores, STEARNS has EXPERIENCE ENGINEERED equipment to meet your specifications.

Complete laboratory research facilities are available for thorough investigation of your separation problem. This includes a complete analysis of the practicability of applying magnetic separation, the testing of sample material, and the recommendation of specific magnetic separation equipment.

Foremost in the Magnetic Field

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Percentage Depletion

THE NATIONAL AGRICULTURAL Limestone Institute reports that the subject of percentage depletion continues to keep its volume of mail high.

One important question on percentage depletion concerns the relationship of the lessee and lessor. It was stated that many operators had the impression that the owner was the only one who benefited from percentage depletion—that a producer who did not own his property could not share this. N.A.L.I. interprets the regulation as follows.

If you are the producer and your gross income is $105,000, $5000 of which is royalty to the owner, and your net is $24,000, you compute the depletion allowance of this property as follows:

(1) Assuming you qualified for the 10 percent depletion allowance, this would give you $10,000 (10 percent of $100,000) as your percentage depletion allowance and you would compute your tax on the $14,000 balance of net income. The owner would have a $500 (10 percent of $5000) percentage depletion allowance and would compute his tax on $4500.

(2) Assuming you qualified for 15 percent percentage depletion allowance, 15 percent of $100,000 would give you $15,000. However, your depletion allowance would be only $12,000 in this case because you cannot have a benefit of more than 50 percent of your net. You would therefore compute your taxes on $12,000. The owner would receive a $750 depletion allowance and compute his tax on $4250.

Atomic Power

THE COWLES COMMISSION for Research in Economics has published a 289-page book, "Economic Aspects of Atomic Power," which is an exploratory study under the direction of Sam H. Schurr and Jacob Marschak. While not attempting to answer the speculative problem of economic effects of peacetime application of atomic power, this exploratory study is the first comprehensive approach to one of the most important and controversial subjects faced by economists today.

The authors have concentrated on the least remote uses of atomic power; the generation of electricity from heat caused by nuclear reactors; and transportation of low temperature heat over short distances. An economic comparison is presented for various areas of the world, between electricity generated from atomic heat and that produced from coal, oil and water power.

This comparison by countries is followed by an analytical study of the potential applicability of atomic power in several industries; which include the production of cement, brick, aluminum, iron and steel, and residential heating. An outline estimate is presented of the effects of atomic power on the economy of a highly industrialized country like the United States.

and second, on the industrialization of so-called backward areas.

This study was initiated by the Committee on Social and Economic Aspects of Atomic Energy of the Social Science Research Council and executed by the Cowles Commission. The book is available for $6 from Princeton University Press, Princeton, N. J.

X-Ray Diffraction

THE WATERWAYS EXPERIMENT STATION of the Corps of Engineers recently announced the addition of an X-ray diffraction apparatus to the facilities at its Concrete Research Division, Jackson, Miss. It is believed to be the first such apparatus to be installed in the state and will be used in studies of cement, admixtures, aggregates and other materials being investigated for use in the Corps of Engineers Civil Works Program.

Studies by other agencies including the Bureau of Reclamation Laboratories, Denver, Colo.; the Portland Cement Association Fellowship at the National Bureau of Standards, Washington, D. C.; the Kentucky Highway Department Research Laboratories, Lexington, Ky., have indicated that the use of X-ray diffraction methods can be a powerful tool in identifying, classifying and understanding the properties of the materials used in concrete construction. It was stated that the apparatus will permit the selection and study of tiny portions of fine-grained materials such as admixtures for concrete, cements, hydrated cements and clays, some of which cannot be satisfactorily studied and identified by microscopic or chemical methods.

The apparatus which has been obtained by the Corps of Engineers is the latest model XRD-3, developed by General Electric X-Ray Co., Milwaukee, Wis., and is designed to be used for making photographic records of X-ray diffraction patterns or for the direct recording of diffracted rays on a strip chart.

Riprap Project

E. C. SCHROEDER CO., INC., McGregor, Iowa, which has carried on extensive mining operations in the United States for the past several years, is now supplying crushed stone ballast between Minneapolis and Chicago, and is working a large riprap project between St. Paul and Savanna, Ill., for the protection of the Burlington tracks against high water of the Mississippi river. Other projects include furnishing crushed stone for paving projects and supplying riprap for other flood control projects.

The Schroeder company recently announced the transaction of 8000 acres of rich iron-ore land at Russellville, Ala., which now gives the company a total of 13,000 acres of ore-bearing land. The company recently completed construction of a washing and flotation plant at its Russellville location.

THE MOST COMPLETE LINE

There are almost 1500 types and sizes in Laughlin's quality line of drop forged fittings.

There are many different styles of shackles, swivels, hooks, thimbles, clips, sockets, eye bolts and other products designed for a wide variety of applications throughout industry. If you use wire rope or chain, you can be sure that Laughlin has the right — *and safest* — fittings for the job.

THESE EXCLUSIVE PRODUCTS

Safety "FIST GRIP" Wire Rope Clips . . . Fool proof, easy to install Fist Grip clips hold rope more securely, can't go on wrong. Fewer clips are required than for ordinary types, and they will not crush or distort the rope.

SAFETY HOOKS . . . The latch locks the load, will not open until released by operator. Strong, drop forged steel hook has improved latch that leaves 80% of throat opening. 15 sizes; 3 patterns, eye, shank and swivel.

"MISSING LINK" (Reg. U.S. Pat. Off.) . . . Cheaper than welding, safer than cold shut or cast link, "Missing Links" go on in a jiffy and are stronger than proof coil chain. 17 sizes from 3/16" to 1⅞".

CLEVIS GRAB AND SLIP HOOKS . . . These sturdy hooks are easily attached to any welded link chain. Pin and cotter make it easy to attach or remove for use on another job. Needs no connecting fittings or special tools.

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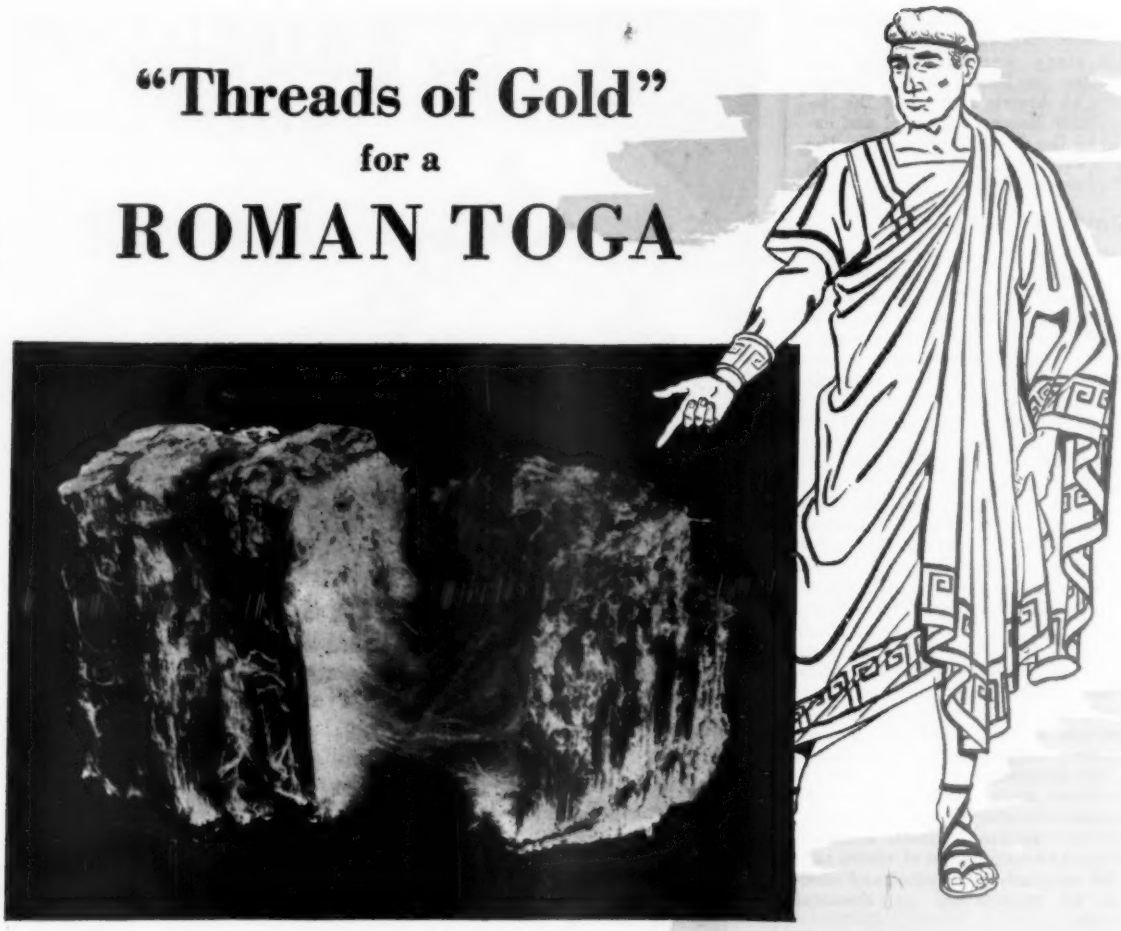
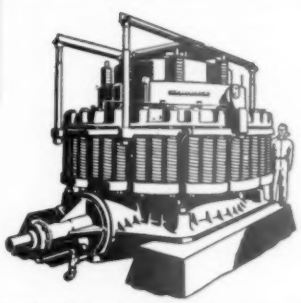


The mineral *Chrysotile,* meaning golden fibers, or threads, supplies over 90% of the world's asbestos requirements. Called the "miracle mineral" by the ancients, the Roman naturalist Pliny (23—79 A.D.) refers to the use of such material as "a rare and costly cloth" used for the funeral garments of kings.

The secret of the great usefulness of asbestos lies in its unique combination of fibrous structure, fire and water resistance, flexibility and strength. Since the profitable recovery of asbestos fiber depends upon fine crushing without destroying fiber length, a crusher that will perform such functions economically, and will produce large quantities of finely crushed material, is essential.

Proof of the world-wide acceptance of *"SYMONS"* Cone Crushers in asbestos production is found in the field, where practically every major producer employs these high capacity, economical machines . . . *as in all of the great ore and industrial mineral operations the world over.*



"SYMONS" Cone Crushers . . . *the machines that revolutionized crushing practice* . . . are built in Standard, Short Head, and Intermediate types, with crushing heads from 22 inches to 7 feet in diameter—in capacities from 6 to 900 tons per hour. C252

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Mine Hoists

"SYMONS" Vibrating Bar Grizzlies and Screens

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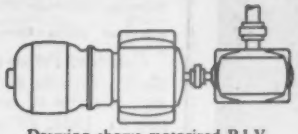
Ask yourself these speed reduction questions . . .

1 Do I want high-ratio reduction with right-angle takeoff?

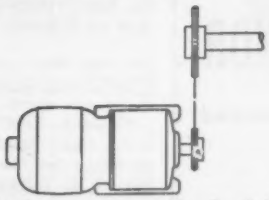


Drawing shows motorized P.I.V. variable speed and worm gear drives direct-coupled.

Then your answer is a LINK-BELT Worm Gear Drive

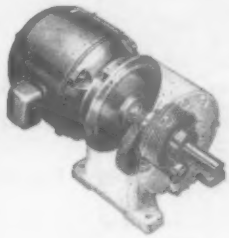
Reduction ratios: 3.1:1 to 8000:1
Torque: 1,400 to 123,000 in. lbs.
Output shaft rpm: 0.22 to 564

2 Is space at a premium?



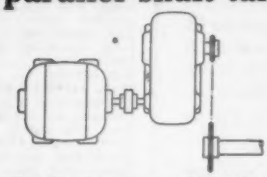
Drawing shows gearmotor with roller chain drive.

Then your answer is a LINK-BELT Gearmotor



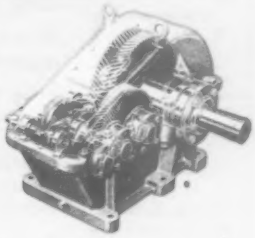
Reduction ratios: 6.2:1 to 292:1
Hp range: 1 to 30
Output shaft rpm: 6 to 280

3 Will I need high hp capacity with parallel shaft takeoff?



Drawing shows motor with herringbone gear and roller chain drives

Then your answer is a LINK-BELT Herringbone Gear Drive



Reduction ratios: 2.84:1 to 318:1
Hp range: ½ to 1000
Output shaft rpm: 2 to 600

Yes, LINK-BELT builds all 3

WHATEVER factor governs your speed reducer selection—ratio, space, shaft position, shock loading—you can get the exact answer to your needs from Link-Belt's complete line of enclosed gear drives.

For Link-Belt builds a full range of sizes and ratios in all three types—Helical, Herringbone and Worm. When a Link-Belt power transmission engineer analyzes your conditions, he can recommend the specific drive to meet your specialized requirements.

For complete information, call the Link-Belt office near you.

LINK-BELT

ENCLOSED GEAR DRIVES

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,859

HEWITT-ROBINS

A "Packaged Unit" to Meet Your Belt Conveyor Needs

The HEWITT-ROBINS SECTIONAL BELT CONVEYOR

Easy to Assemble ***Pre-Engineered***

Strongly Constructed

Here is the complete belt conveyor that will meet the requirements of both small and large operators handling bulk materials.

Easy to Assemble: Your own men can assemble, disassemble, move, extend or shorten it quickly and easily.

Take Your Choice: Select the right belt conveyor to fit your own particular needs—you have a choice of 3 types of drives—wide selection of intermediate truss lengths—your choice of idlers—(4", 5" or 6" diam.)—4 belt widths (18", 24", 30" or 36") in lengths up to belting limitations.

Factory-Assembly Units: All truss side members are factory-welded as complete units and are jig-drilled for easy erection—head and tail units completely assembled with machinery in place.

Standard Equipment: Self-cleaning, protective decking for return strand supplied for the entire conveyor line.

Optional Equipment: Hood covers—easily attached loading hopper.

Only Hewitt-Robins is able to take single unified responsibility for a belt conveyor installation—both machinery and belt.

Get the complete story. Write for Bulletin No. 132.

HEWITT-ROBINS HR INCORPORATED

ROBINS CONVEYORS DIVISION

270 Passaic Avenue, Passaic, N. J.

FINANCIAL

RECENT DIVIDENDS

Alpha Portland Cement Co.	$ .50	Mar. 10
American Aggregates Corp. —S	.50	Feb. 29
American Aggregates Corp. —pf.—Q	1.25	Apr. 1
Consolidated Rock Products Co.	.05	Mar. 15
Coronet Phosphate Co.	2.00	Mar. 31
Dragon Cement Co., Inc.—Q	.40	Mar. 10
Giant Portland Cement Co.—Stk.	2%	Apr. 1
Hercules Cement Corp.	.25	Apr. 1
Marquette Cement Mfg. Co.	.20	Mar. 5
National Gypsum Co.—$4.50 pf.—Q	1.12½	Mar. 1
Permanente Cement Co.—Yr. E.	.15	Jan. 31
Permanente Cement Co.—Q	.30	Jan. 31
Raymond Concrete Pile Co. —E	.25	Mar. 3
Raymond Concrete Pile Co. —Q	.50	Mar. 3
Standard Silica Corp.—Q	.12½	Feb. 15

CORONET PHOSPHATE CO., New York, N. Y., reports a net income of $449,861, for the 12 months ended December 31, 1951, as against a net income of $743,665, for the year ending December 31, 1950. Earnings per share amounted to $17.99, on 25,000 shares, for the 1951 period, and $29.75 per share for the preceding year.

WARNER CO., Philadelphia, Penn., for the 12 months ending December 31, has reported its sales and earnings as follows:

	1951	1950
Net sales, etc.	$23,910,465	$19,773,807
Net profit	2,592,001	3,370,558
Earnings, com. share	$5.46	$7.10
No. of com. shares	474,329	474,329

CANADA CEMENT CO., LTD., Montreal, Can., has listed its consolidated earnings for the years ended November 31, as follows:

	1951	1950
Operating profit	$15,275,952	$13,461,413
Deprec. & deplet.	4,095,512	3,893,350
Directs.' fees, etc.	165,913	167,575
Balance	11,014,527	9,400,488
Income from invest.	120,723	92,014
Total income	11,135,250	9,492,502
Bond interest	12,000	27,387
Deb. disc. & exp.	50,035	
Legal exp.	5,178	
Pension fund	590,000	410,000
Cap. assets loss	60,449	73,599
Loss, securities sold	77,940	
Income taxes	5,535,000	3,775,000
Net income	4,804,648	5,206,516
Prev. earnings surp.	11,540,336	9,232,963
Preference divs.	1,274,725	1,292,155
Common dividends	1,200,000	900,000
Pref. stk. purch.		706,988
Earn. surp., 11-30	13,870,259	11,540,336
Times chg. earnings	167.67	
Earn., pref. share	$4.90	$5.30
Earn., com. share	5.88	6.52
No. of pref. shares	980,558	980,558
No. of com. shares	600,000	600,000

GENERAL PORTLAND CEMENT CO., Chicago, Ill., gives the following account of income for the years ended December 31:

	1951	1950
Net sales	$27,121,000	$24,413,700
Net income	4,532,400	5,907,700
Earnings, com. share	$4.36	$5.68
No. of com. shares	1,039,971	1,039,971

THE KELLEY ISLAND LIME & TRANSPORT CO., Cleveland, Ohio, set a new sales record in 1951, according to preliminary figures recently released. Sales were reported to be approximately $12,825,000, compared with $12,146,926 in 1950. Estimated net income was equal to $3.55 per share in 1951, compared with $3.72 in 1950. The 1952 sales volume should compare favorably with that of last year, according to Ralph L. Dickey, president. Projected sales of fluxstone are

expected to be about 20 percent ahead of last year, due to the unprecedented demand by the steel industry. The 1952 sales will be further increased by the recent introduction of an incombustible acoustical tile developed by the company.

MISSOURI PORTLAND CEMENT CO., St. Louis, Mo., for the years ended December 31, reports the following income account:

	1951	1950
Net sales	$12,579,421	$12,086,086
Cost of sales	7,325,451	6,687,260
Selling, etc., expenses	1,436,266	1,017,621
Net earnings	3,817,704	4,381,205
Other income	139,218	86,423
Total income	3,956,922	4,467,629
Other deductions	119,636	141,845
Depr., depl., etc.	809,339	750,223
Income taxes	1,424,043	1,555,292
Excess profits tax	170,000	260,000
Net income	1,433,904	1,760,269
Earnings surplus, 1-1	4,539,086	3,367,079
Dividends	514,729	588,262
Sundry reserves	cr 50,000	
Goodwill	1	
Earnings, surpl., 12-31	5,508,260	4,539,086
Earned per share	$4.87	$5.98
No. of shares	294,131	294,131

INTERNATIONAL MINERALS AND CHEMICAL CORP., Chicago, Ill., for the six months ended December 31, 1951, has reported a net income of $1,703,492, or $0.70 per share on 2,160,161 common shares, compared with $1,796,382, or $0.80 per share on 2,000,000 shares for the corresponding period in 1950. Sales for the same 1951 period totaled $31,846,547, as against $25,114,894 for 1950.

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., reports consolidated earnings for the 12 months ended December 31, as follows:

	1951	1950
Net sales	$22,952,742	$18,929,546
Other revenue	1,397,633	1,436,232
Total	24,350,375	20,365,779
Cost of sales, etc.	13,988,262	12,454,124
Selling, etc., expenses	2,465,737	2,342,451
Other expenses	310,259	488,727
Net earnings	7,586,117	5,080,477
Interest	274,447	133,948
Income taxes	4,316,129	2,154,828
Net profit	2,995,540	2,791,702
Earnings pfd. share	$18.44	$42.95
Earnings com. share	$3.30	$8.11
No. of pfd. shares	162,475	65,000
No. of com. shares	850,000	320,000

LONE STAR CEMENT CORP., New York, N. Y., has given the following account of income for the 12 months ended December 31:

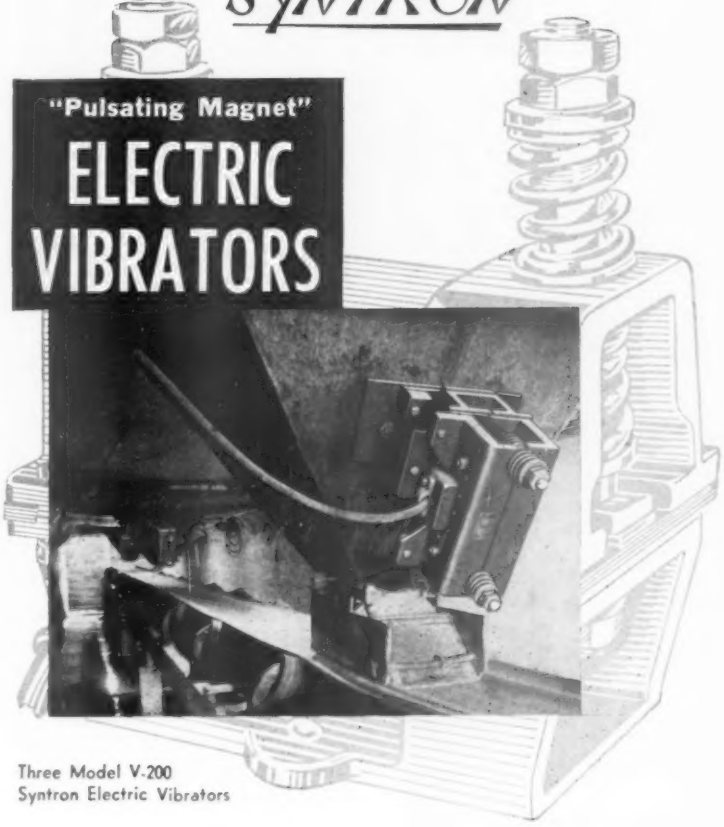
	1951	1950
Sales	$71,381,917	$64,390,582
Mfg., etc., costs	39,771,921	35,983,622
Selling, etc., expenses	5,510,436	5,400,087
Deprec. & deplet.	2,943,270	2,123,078
Operating profit	23,156,290	20,883,795
Other income	1,265,378	411,020
Total income	24,421,668	21,294,815
Federal income tax	9,000,000	6,250,000
Excess profits tax	1,500,000	750,000
Other income tax	2,307,078	1,360,072
Other taxes	2,116,725	2,045,444
Misc. charges	921,349	459,007
Foreign exch. res.	225,000	400,000
Net profit	8,350,805	10,030,292
Earned per share	$2.93	$10.56
No. of shares	2,845,791	948,597

IDEAL CEMENT CO., Denver, Colo., has announced that more than the required 80 percent of Pacific Portland Cement Co. stock necessary for carrying out the reorganization of the two companies had been deposited prior to December 31, 1951, when the initial deposit period expired. The reorganization, therefore, became effective, although an additional period to January 31 had been granted for the deposit of additional Pacific shares under the proposal.

SYNTRON

"Pulsating Magnet"

ELECTRIC VIBRATORS



Three Model V-200
Syntron Electric Vibrators

For smoother material flow with no unscheduled stoppages due to material arching and plugging in bins, hoppers and chutes . . . apply Syntron Electric Vibrators.

The right size Syntron Vibrator properly applied sets up a flow of high speed vibrations (3600 vib. per min.) that will cause the most stubborn and difficult material to flow freely, and that will move tons of inert weight.

Syntron Electric Vibrators will save their cost by eliminating damage to equipment by sledging and rodding . . . cutting down replacement costs.

The Vibrators are widely used on storage bins, hoppers and chutes for flowing materials ranging from fine powder to large chunks. Available in a variety of sizes . . . small models for little hoppers and large heavy-duty models for big bins and bunkers.

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APPLICATIONS

Conical or Rectangular Hoppers

Parabolic Hoppers

Flat Bottom Bin with Center Discharge

Wooden Hoppers

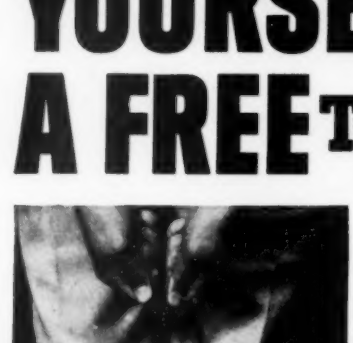
Concrete Hoppers

Inclined Chutes

Hopper with Sloping Discharge

SYNTRON COMPANY
450 Lexington Avenue — Homer City, Penna.

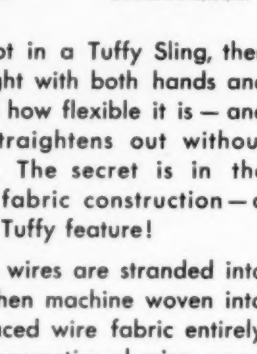
MAKE THIS TEST YOURSELF...WITH A FREE Tuffy SLING



Patent No. 2,454,417

Tie a knot in a Tuffy Sling, then pull it tight with both hands and feet. See how flexible it is — and how it straightens out without damage. The secret is in the braided fabric construction — a patented Tuffy feature!

Scores of wires are stranded into 9 parts, then machine woven into an interlaced wire fabric entirely unlike conventional wire rope slings. Even cutting one of the 9 parts does not result in stranding. And eye splices develop up to 95% of the fabric strength.



11 Types of Tuffy Slings If none of the 11 factory packaged Tuffy Sling types exactly meet your needs, Union Wire Rope engineers will develop one that does. Tuffy Slings are proof-tested to twice safe working load. The safe working load is stamped on a metal band attached to each sling. If you have your own rigging loft, Tuffy braided fabric is available by the reel.

MAIL COUPON TODAY FOR YOUR FREE SLING
This special 3-foot sample is yours without cost so, that you can prove to yourself the advantages of a Tuffy Sling. Just mail the coupon.

UNION WIRE ROPE CORP

More scrap means more steel turn yours in today!

UNION WIRE ROPE CORPORATION
Specialists in Wire Rope, Braided Wire Fabric and High Carbon Wire
2156 Manchester Ave. Kansas City, Mo.

Gentlemen: Please have my Union Wire Rope Fieldman deliver my free Tuffy sling sample.

NAME _____

FIRM NAME _____

ADDRESS _____

CITY _____ ZONE ____ STATE _____

New Incorporations

North Arkansas Lime Products, Inc., Harrison, Ark., has been incorporated by Sterlin Hurley, A. Hickenbottom, Lon Estes and Ralph Estes. Authorized capital was listed as 1500 shares of stock, no par value.

Greenwood Brikcrete, Inc., Greenwood, S. C., has been incorporated with an authorized capital of $25,000, for the production of masonry products. The company is headed by S. A. Agnew.

Newton Concrete Products, Inc., Newton, Kan., was recently incorporated with an authorized capital of $50,000. The company will produce concrete block, incinerators, ready-mixed concrete and pumice block. Robert A. Haury is resident agent for the firm.

Base Central Mix, a ready-mixed concrete company, Rapid City, S. D., recently filed articles of incorporation. Directors listed were W. D. Lynn, Charles N. Keown and Clifford R. Stearn. A capital stock of $100,000 was authorized.

Rochester Sand, Inc., Milwaukee, Wis., has been incorporated with 200 shares of stock, par value, $100. Minimum capital was listed as $1000. The incorporators are R. E. Boehck, Ruth E. Schwan and F. B. Meinecke.

Sidney Ready Mix Concrete Co., Sidney, Ohio, has been incorporated by Elizabeth L. Raterman, Patricia S. Schulze and Arthur F. Frantz. The firm has been authorized to issue 1500 shares of no par common stock.

American Mica Products Co., New York, N. Y., was recently incorporated by Florence Friedman.

Baytown Ready-Mixed Concrete Co., Pasadena, Texas, has been granted a charter with capital stock listed as $100,000. Incorporators are E. E. Whitman, Frank Kurtz and F. H. Gillespie.

Sidney Sand and Gravel Co., Sidney, Ohio, has been incorporated by Joseph L. Hershey, Samuel J. Milligan and William Milligan with 200 shares no par common stock.

Green Valley Gravel Co., San Marcos, Texas, has been granted a charter, with capital stock of $15,000. Incorporators are J. D. Cummings, Ernest Cummings and I. C. Little.

Western New York Gravel & Concrete Corp., Batavia, N. Y., has been incorporated with $50,000 in capital stock, consisting of 5000 shares of common stock, $10 par value. Directors are listed as Philip, Anthony, Richard, Angelo and Francis Penepent.

Lakefield Sand and Gravel Co., Milwaukee, Wis., has been incorporated with 500 shares of stock, n.p.v. Minimum capital was listed at $500. Nick A. Saiia, Elroy Larsen and J. G. Haislmaier are the incorporators.

MANUFACTURERS NEWS

Atlas Powder Co., Wilmington, Del., announces that D. J. Carroll Copps has been appointed general manager of the explosives department, with W. G. Frome, vice-president, continuing as administrative head of the department. William C. Lytle, manager of the explosives research division, and Max E. Colson, manager of the explosives plant near Tamaqua, Penn., have been named assistants to Mr. Copps. Dr. William Taylor, Jr., now assistant director of the explosives laboratory, succeeds Mr. Lytle as manager of explosives research, and Roland W. Oberholtzer succeeds Mr. Colson as Tamaqua plant manager. Ralph M. Holiday has been named to succeed A. Nelson Chase as manager of the explosives plant near Joplin, Mo. Mr. Chase will serve as assistant to the explosives operations director until his retirement June 1.

Baldwin-Lima-Hamilton Corp., Lima-Hamilton Div., Lima, Ohio, has appointed Paul R. Ehrgott as assistant to the resident vice-president in addition to his duties as sales manager in charge of shovel sales of 3-cu. yd. capacity and larger. J. W. Hardesty has been appointed sales manager of small shovels and cranes. He was formerly district manager of the territory including northern Ohio, Indiana, Illinois, Michigan, Missouri and Kansas.

Hudson Pulp & Paper Corp., Chicago, Ill., announces the appointment of Julian B. Mendelsohn as sales manager of the multiwall sack department. He was formerly division manager of the metropolitan New York division.

The J. B. Ehrsam & Sons Manufacturing Co., Enterprise, Kan., announces that W. G. Brainerd has been appointed sales manager of the company.

Macwhyte Co., Kenosha, Wis., has elected George C. Wilder as vice-president and assistant general manager. He has been serving as assistant to the general manager since 1949. Other officers of the company are: Jessel S. Whyte, president and general manager; H. E. Sawyer, vice-president and treasurer; R. B. Whyte, vice-president in charge of operations; and R. P. Tyler, vice-president in charge of sales.

Denver Equipment Co., Denver, Colo., is celebrating its 25th anniversary of supplying mill equipment to the mining industry throughout the world. The firm has made many contributions toward improving and simplifying metallurgy in the industry, including the "Sub-A" flotation machine, "Sub-A" unit flotation cells, and the selective mineral jib.

Link-Belt Co., Chicago, Ill., announces the appointment of Dr. Lauriston C. Marshall as director of the new physical testing and research laboratory in Indianapolis, Ind.

Shovel and dragline load up to 90 cu. yds. of material per hr. for loading and stockpiling operations.

BANTAM® costs only a fraction of the price of bigger machines — has speed and low weight to go ANYWHERE!

Over 3000 Bantams in service all over the world prove the dependability and economy of this low cost truck-mounted excavator for handling all kinds of *pioneering, loading, stockpiling, re-handling and clean-up jobs* around pits and quarries. Eight fast-change Bantam attachments assure complete versatility for profitable year-'round operation. Write for the facts:

Back Hoe attachment digs 100' of 5' trench per hr. for handling sewer and water line work, pit drainage.

Crane lifts 10,000 lbs. for handling culverts, erecting steel, pouring concrete, etc. Works with 50' boom.

Schield Bantam Co., 216 Park St., Waverly, Ia.
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SCHIELD BANTAM
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Get more jobs done at less cost

CLEVELAND WIRE SCREENS

Cleveland Vibrating Screen Sections last *longer* because they are made *better* . . . accurately woven production tempered abrasion-resistant steel...*tough*, yet ductile . . . to withstand the day-in, day-out shattering action of high-tonnage vibrating units. Ask the men who use them—they'll tell you Cleveland Wire Screens mean *more* tons per man hour, *less* down-time . . .

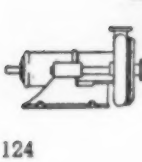
- Toughness and Ductility
- Longer Productive Service
- Reduction of "Breaks" in Screen
- Rigid Accuracy of Openings Maintained Continuously
- Built and Designed with Experienced "Know How"

Write today for Bulletin No. 6

THE CLEVELAND WIRE CLOTH & MFG. CO.
3576 E. 78th STREET • CLEVELAND 5, OHIO

Split Bearing Stand Cuts Maintenance Cost of NAGLE PUMPS

Just unscrew (or cut off with a torch if necessary) four nuts on each side and the top half of the bearing stand lifts off exposing the bearings. Merely loosen one nut on each side to release tubular supports, for slippage seal adjustment. Instant "thumb & forefinger" packing gland adjustment. Impellers, plates or casings changed in a jiffy. These and other features cut maintenance costs to the bone. That is why Nagle Pumps are preferred for the really tough pumping jobs. Also vertical shaft pumps for pumping abrasive or corrosive materials.



Nagle Pumps, Inc.
INDUSTRIAL PUMPS FOR ABUSIVE APPLICATION
1269 Center Ave. Chicago Heights, Ill.

Farrel-Birmingham Co., Inc., Ansonia, Conn., has acquired the common stock of Consolidated Machine Tool Corp., Rochester, N. Y., which will be operated as a subsidiary of Farrel-Birmingham. Arthur H. Ingle remains as president of Consolidated and becomes a director of Farrel-Birmingham.

J. B. Ehrsam and Sons Manufacturing Co., Enterprise, Kan., announces the appointment of W. J. Ehrsam, Jr., as president and general manager.

Reeves Pulley Co., Columbus, Ind., has announced the appointment of James A. Miller as manager of the new sales and engineering office in Los Angeles. Assisting him in the operation of the new office is Harlan M. Gillis, an engineering graduate of Northeastern University, Boston, and formerly a member of the engineering department in Columbus.

The Baker-Raulang Co., Cleveland, Ohio, has elected Edwin W. Sankey as vice-president and assistant to the president, and John A. Matousek as vice-president in charge of manufacturing.

Olin Industries, Alton, Ill., has announced the election of Lt. Gen. E. R. Quesada of the United States Air Force (retired) as vice-president and director of the company, to work directly with the expansion program in the field of cellulose and minerals.

Fairbanks, Morse and Co., Chicago, Ill., has announced the following changes in sales personnel: J. A. Cuneo, formerly manager of the Chicago branch, has been promoted to general sales manager; H. L. Hilleary continues as assistant sales manager; Milo C. Roy, formerly manager of the Omaha branch, has been appointed manager of the Chicago branch; J. W. Wright, formerly manager of the diesel sales division, Chicago, has been appointed manager at Omaha; C. E. Dietle, formerly diesel department manager, Chicago, has been promoted to manager of the diesel sales division; W. B. Wylly, formerly manager of the Houston, Texas, sub-branch, has been appointed manager of the Atlanta branch; L. A. Woem, formerly manager of the St. Louis branch, has been transferred to St. Paul as branch manager to succeed A. C. Thompson who has retired after 45 years of service; Clifford J. Schroeer, formerly diesel department manager, St. Louis, has been promoted to manager of the St. Louis branch succeeding L. A. Weom.

Universal Form Clamp Co., Chicago, Ill., has promoted D. M. DeCanio to general sales manager in addition to his duties as chief engineer.

The Commercial Shearing and Stamping Co., Youngstown, Ohio, has elected Charles B. Cushwa, Jr., as president of the company to succeed his late father who died December 8. Herbert B. Wollison, vice-president of the subsidiary, Commercial Shearing and Stamping, Inc., Chicago, Ill., has

been elected vice-president of the parent company as well and a director of both companies. Ivory C. Jones, comptroller, has also been elected secretary, and Wilbur J. Clarke has been made assistant treasurer and assistant vice-president. Ward Beecher has been named to succeed the late Mr. Cushwa as chairman of the board of Commercial Shearing and Stamping, Inc.

Mack Trucks, Inc., New York, N. Y., has announced the election of Pierce J. Fleming as a vice-president of the company. He was formerly manager of the off-highway sales division.

John A. Roebling's Sons Co., Trenton, N. J., has appointed Donald C. Hansen as district sales representative for the woven wire fabrics division in Ohio, Michigan and western New York.

Hewitt-Robins, Inc., New York, N. Y., announces that Norman M. Godfrey has been appointed manager of the Eastern sales division. G. V. Migula has joined the company as manager of the Western sales division with headquarters at San Francisco. He replaces J. H. Hayden, who has retired but will continue to serve in an advisory capacity. Marion D. Austin, formerly manager of hose sales and development, Buffalo, N. Y., has been appointed district manager of the Western sales division. K. L. Way, who has been in the product sales department for 23 years, has been named to succeed Mr. Austin.

Westinghouse Electric Corp., Pittsburgh, Penn., has announced the appointment of George E. Goodrich as assistant manager, industrial department, apparatus division. He was formerly resale manager of the Middle Atlantic district.

Koppers Co., Inc., Pittsburgh, Penn., has promoted John A. Hartzell to the position of sales manager of the engineering and construction division. He succeeds Ward L. Gable, who has retired but will remain with the company as a special sales consultant. C. W. Mohme has been named assistant to the production manager. C. K. Waibel has been appointed a sales engineer, and C. E. Mielke and H. A. Grosick have been made contract engineers.

Link-Belt Co., Chicago, Ill., has appointed L. J. Carson as general manager of the Colmar, Penn., plant, which is now under construction and is scheduled to be in operation during the last quarter of 1952. He was formerly general manager of the Minneapolis plant. Mr. Carson has resigned as price executive of the Machinery Branch of the Industrial Materials and Manufactured Goods Division of the O.P.S., Washington, D. C.

Air Reduction Co., Inc., New York, N. Y., announces that John Lund has been appointed district manager of Air Reduction Magnolia Co., a division of the company, with headquarters at Shreveport, La. He succeeds the late Heber T. Wadley.

ANOTHER

MAXI-MOUNTED CLAMSHELL*

. . FOR THESE MAXIMUM ADVANTAGES:

- one-man control
- operation stability through 360°
- close quarter maneuverability
- fast travel—either direction

★ Link Belt Speeder MS-70 Zephyr-crane handling fill for Chicago Transit Authority. Low boom operation under high tension wires requires maximum crane carrier stability.

Write for additional information.

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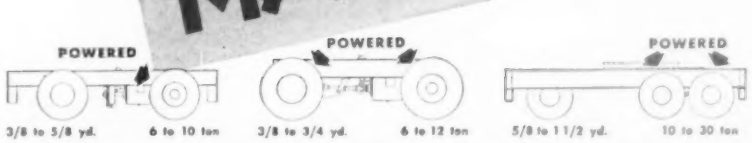
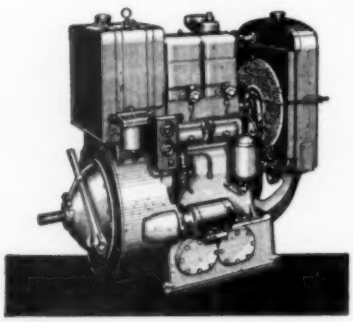


ENGINEERED AND MANUFACTURED BY SIX WHEELS, INC. • LOS ANGELES 11, CAL.

10 REASONS why your next power unit should be a NORDBERG Diesel



1. Expressly developed to meet the need for simple, compact engines of small horsepower.
2. Low initial cost.
3. Choice of 1, 2, or 3-cylinder sizes, ranging from 10 to 45 H.P. or 6 to 30 K.W.
4. Choice of generator, centrifugal pump, stub shaft, or clutch power take-off.
5. Each unit is complete, self-contained, ready to operate.
6. Built to the same exacting standards as the larger Nordberg Diesels.
7. Maximum operating economy—often pays for itself in less than a year.
8. Simple to operate, easy to service, no trained operators necessary.
9. Heavy duty construction throughout for long life.
10. Thermostatically controlled cooling system, heavy duty oil bath air cleaner, fuel and lubricating oil filters and lube oil cooler are all STANDARD on Nordberg units.

NORDBERG MFG. CO., Milwaukee, Wisconsin

NORDBERG
BUILDERS OF AMERICA'S LARGEST LINE OF HEAVY DUTY DIESELS

MAIL THIS COUPON TODAY

Nordberg Manufacturing Company
Milwaukee, Wis. 4-252—ICQFMOP

Please send literature describing the full line of Nordberg "4FS" Diesel Power Units.

Your Name_____

Company_____

Address_____

City_____ Zone____ State_____

H. K. Porter Co., Inc., Pittsburgh, Penn., announces that J. R. Lewis has been appointed general sales manager of Quaker Rubber Corp., a division of the company. He has been with the corporation more than 11 years, serving successively as Philadelphia district sales manager, assistant sales manager and assistant general sales manager.

Cummins Engine Co., Inc., Columbus, Ind., has announced the appointment of John T. Weber as manager of sales development, succeeding Howard P. Sharp, who has resigned. Mr. Weber's duties include the coordination of programs for advertising, technical literature, market research, sales training and publicity.

Le Roi Co., Milwaukee, Wis., manufacturer of portable air compressors, tractor-compressors and rock drills, announces the election of T. O. Liebscher as president of the company. He joined the firm in 1940 as assistant secretary and assistant treasurer and subsequently became secretary-treasurer. In 1946 he was elected to the board of directors and became executive vice-president in 1950. G. J. Hamm has been appointed secretary-treasurer; C. W. Decker, assistant secretary, and J. R. Gavigan, assistant treasurer.

T. O. Liebscher

The Baker-Raulang Co., Cleveland, Ohio, has elected G. B. Davis as vice-president in charge of sales. He succeeds John R. Morrill who has resigned.

Pekor Iron Works, Columbus, Ga., announces that Charles F. Pekor, Jr., has returned to the company as general manager, and Clyde A. Butler is again general superintendent. Mr. Pekor succeeds his brother, R. Briggs Pekor, who has resigned to organize a new business.

R. G. LeTourneau, Inc., Peoria, Ill., announces the appointment of John H. Way as district sales representative in the states of Colorado, Wyoming, Montana and Idaho, with headquarters in Denver, Colo.

Air Reduction Co., Inc., New York, N. Y., has announced the election of Joseph H. Humberstone as a vice-president of the company. He was formerly president of the Airco equipment manufacturing division and has been succeeded in this position by Scott D. Baumer.

Joseph T. Ryerson and Son, Inc., Chicago, Ill., has announced that Everett D. Graff, chairman of the executive committee, has retired from active service with the company and will be succeeded by Harold B. Ressler, first vice-president. Mr. Graff has been associated with Ryerson for 45 years and was president from 1937 through 1950. He will continue on the board of directors and also on the board of the Inland Steel Co. Mr. Ressler has been with the company for 47 years.

The Euclid Road Machinery Co., Cleveland, Ohio, has established a sales and service branch in Monrovia, Calif. A. E. Sorensen, formerly branch manager at Emeryville, Calif., has been appointed manager of the new branch. P. A. McDonald succeeds Mr. Sorensen as manager at Emeryville. He was formerly district manager at Minneapolis, Minn., and will be succeeded in this position by W. P. Sutherland, assistant to the domestic sales manager.

Hewitt-Robins, Inc., New York, N. Y., has formed a South Central sales division with headquarters in Houston. L. C. Holloman has been appointed assistant division manager in charge of the division, which covers Texas, western Tennessee, Oklahoma, Arkansas, Louisiana, Mississippi and Alabama.

Stearns Manufacturing Co., Inc., Adrian, Mich., has announced the election of Lee E. Joslyn, Jr., as president of the company. Myron Hultmark has been elected vice-president in addition to his duties as general manager in charge of operations. Pierce E. Wright, Claude F. Rowell and Walter G. Schutt have been appointed vice-presidents; V. Hudson White, treasurer; Daniel S. Hall, secretary; Stanley L. Fildew, assistant secretary and John L. Tuttle, assistant treasurer. Messrs. Fildew, Joslyn, White, Wright and Curtis M. Wylie have been elected directors.

The Frank G. Hough Co., Libertyville, Ill., announces the appointment of Gene Thomas as district representative for the states of Washington, Oregon, Idaho, Montana and Wyoming.

American Brake Shoe Co., New York, N. Y., announces that Edward R. Anderson has been appointed president of the American Forge division, and William E. Crocombe has been made assistant to the chairman of American Brake Shoe Co. Mr. Anderson was formerly vice-president of the brake shoe and castings and Kellogg divisions. Mr. Crocombe has reached retirement age but will continue to be available for special assignments by the chairman of the board. Fred P. Biggs, president of the brake shoe and castings division, has also been elected a vice-president of American Brake Shoe Co.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis., has appointed William M. Wallace an assistant to the vice-president of the general machinery division. He was formerly special assistant to G. V. Woody, manager of the processing machinery department. Elvin R. Danielson has been made supervisor of priorities, succeeding the late Robert T. Ward. Harold H. Heinecke has been named assistant manager of the commercial research department, general machinery division. He was manager of market re-

10 Times More Hammer Life!

with

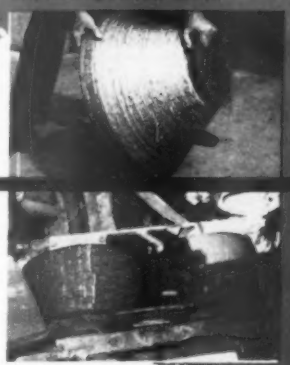
STOODY

SELF-HARDENING 21

Average increase in crusher life resulting from hard-facing is 25% to 50%. Although even this figure is profitable, unusual returns sometimes occur. For example, manganese swing hammers crushing quartzite—95% silica—in a midwestern plant lasted one hour. The mill then had to be shut down for replacements. Hard-faced with Stoody Self-Hardening 21, the same hammers do a ten-hour shift.

At the end of the shift the hammers are removed and corners are rebuilt with Stoody Self-Hardening 21. Such re-application is done over and over and hammer life is extended indefinitely.

BELOW: CRUSHER LINERS AND CONES may be hard-faced either manually or automatically. The cone below received automatic application of Stoody 121 and 103, restoring size and service.



All crushers last longer when they're protected with Stoody Hard-Facing Alloys . . . rolls, cones, liners and hammers alike! Ask your Stoody Dealer for crusher hard-facing information—He's listed under "Welding Equipment & Supplies" in your Yellow Classified Telephone Directory.

NOTE

Many operators are now rebuilding and hard-surfacing rolls, gyratory cones and liners by the automatic welding process, using STOODY Automatic Hard-Surfacing wires. Ask your Stoody Dealer for a list of shops having automatic hard-facing facilities in your neighborhood, or write direct.

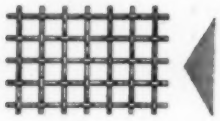
LEFT: CRUSHER ROLLS—Extra wear results by manually applying a single layer of A.C.-D.C. Stoodite over a layer of Stoody Self-Hardening 21.

STOODY COMPANY

11929 E. SLAUSON AVENUE, WHITTIER, CALIFORNIA

At Your Service...

Our engineers are at your service to help you determine the proper ration of grinding balls to avoid overgrinding.



Cal-Wic Screens, from filter cloth to 6-inch space cloth

THE CALIFORNIA WIRE CLOTH CORPORATION, OAKLAND
THE COLORADO FUEL & IRON CORPORATION, DENVER
WICKWIRE SPENCER STEEL DIVISION, NEW YORK

STEEL FOR THE MINING INDUSTRY

THE COLORADO FUEL & IRON CORPORATION CF&I

Slurries...handled at lower cost

The new WILFLEY MODEL K Centrifugal Sand Pump embodies important mechanical improvements especially adapted to the handling of cement slurry and results in stepped-up production and substantial power savings. Individual engineering. Write for details.

Buy WILFLEY for Cost-Saving Performance

A. R. WILFLEY & SONS, Inc.
Denver, Colo., U.S.A.
New York Office: 1775 Broadway, N.Y.C.

WILFLEY centrifugal PUMPS

KEEP ABREAST WITH INDUSTRY TRENDS THROUGH ROCK PRODUCTS

search at Perfex Corp., Milwaukee, before joining Allis-Chalmers. Leroy A. Sweinberg, formerly assistant engineer in the processing machinery department, has been assigned to the Wilkes-Barre district office as a sales representative.

Caterpillar Tractor Co., Peoria, Ill., has announced the acquisition of all capital stock of the Trackson Co. of Milwaukee, Wis. Louis B. Neumiller, president of Caterpillar, has been named chairman of a reconstituted Trackson board of directors which includes Walter H. Stiemke, president of the Trackson Co.; William Blackie, Ralph M. Monk and J. R. Munro of Caterpillar. Mr. Stiemke and L. E. Dauer, Trackson vice-president, will continue in their present administrative capacities. Henry Gotfredson, secretary and treasurer of Trackson, plans to retire and will be succeeded by George L. Scripps, who will relinquish his position as assistant treasurer of Caterpillar.

American Air Filter Co., Inc., Louisville, Ky., announces that its Canadian business will be handled by American Air Filter of Canada, Ltd., Montreal. William G. Hole, formerly of Darling Bros., Ltd., will be in charge of all operations.

The American Pulley Co., Philadelphia, Penn., announces the appointment of Harry W. Gordon as district manager covering the states of Washington, Oregon, Montana, Idaho and Wyoming and the provinces of British Columbia and Alberta, Canada, with headquarters in Seattle, Wash. Sidney H. Hewett has been named district manager in the Detroit area, which comprises sections of Michigan, Ohio, Indiana and Kentucky, with headquarters in Plymouth, Mich.

United States Rubber Co., New York, N. Y., has appointed H. Barden Allison as district sales manager of the Philadelphia branch, mechanical goods division. He succeeds A. B. Means who continues in the capacity of sales advisor.

Cleveland Chain & Mfg. Co., Cleveland, Ohio, announces that George P. Long has joined the company as assistant general sales manager.

The Timken Roller Bearing Co., Canton, Ohio, has announced the appointment of Sherman R. Lyle of the Cleveland office as district manager of the steel and tube division, northern Pennsylvania and New York State district, with headquarters in Buffalo, N. Y.

Waukesha Motor Co., Waukesha, Wis., announces that Charles E. Nelson, Jr., vice-president of production since February, 1949, has been elected a director of the company.

Olin Industries, Inc., East Alton, Ill., has announced the appointment of M. W. Acker, director and vice-president, as general manager of the metals division with headquarters at East Alton. M. F. Meissner has been named assistant general manager. W.

C. Schade has been appointed general manager of the arms and ammunition division, and W. S. Allen has been named general manager of the electrical division, both with headquarters at New Haven, Conn. N. A. Hamilton has been appointed general manager of the explosives division with headquarters at East Alton, and O. E. Nelson has been named general manager of the export division with headquarters at New Haven, with A. K. Lang as assistant general manager. George L. Dawson has been appointed staff assistant to the executive vice-president.

The Dorr Co., Stamford, Conn., announces that J. Delano Hitch, formerly vice-president in charge of sales, has been promoted to the position of executive vice-president. T. Bartow Ford, manager of international sales, has succeeded Mr. Hitch as vice-president in charge of sales, and has been elected a director of the company. John H. E. Fedeler, an assistant manager of international sales, has succeeded Mr. Ford as manager.

J. Delano Hitch

Mr. Hitch joined the company in 1927 upon completing his civil engineering course at Harvard Engineering School. From 1929 to 1937 he was Far Eastern representative with headquarters in Tokyo. He returned to New York in 1937 as export sales manager. In 1945 he went to China as technical adviser to the Office of Strategic Services. In 1946 he was elected a director of the company and vice-president in charge of sales.

T. Bartow Ford

Mr. Ford received his degree in chemical engineering from the Georgia School of Technology in 1926 and began his career with The Dorr Co. in the Atlanta office, first as a junior engineer, and later as manager. In 1936 he was assigned to Tokyo, succeeding Mr. Hitch in 1937 as administrative head of activities in Japan and the territories of Manchuria, Korea and Formosa. In 1941 he returned to the United States, becoming assistant manager of the industrial division, Chicago, and in 1936, manager of international sales, New York.

Mr. Fedeler, who succeeds Mr. Ford as manager of international sales, is a mechanical engineering graduate of Stevens Institute of Technology, class of 1931, and had ten years of filtration experience before joining The Dorr Co. in international sales.

Picture shows how a Sauerman Slackline Cableway digs gravel deep under water and hauls the material to top of screening plant. Swinging in a wide arc, the machine moves a huge yardage at one setup of the mast.

SAUERMAN method . . .

Simplifies Material Handling!

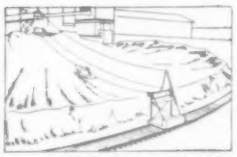
Wherever there are problems of long range excavating or stockpiling, Sauerman Drag Scrapers and Slackline Cableways constantly prove their ability to handle large yardages at low cost.

A Sauerman machine reaches across a river, down into a pit, up to the top of a hill or across a wide stockpile — moves material from any point within its radius, and dumps automatically wherever required. One-man control, fast action. Maintenance is easy; a few expendable parts take all the wear.

Whether your project is large or small, there is a size and type of Sauerman machine suited to your requirements — a machine that will give you years of steady service at minimum expense, no matter how tough the work it is called upon to do.

Write us about your interests and we will send illustrated catalog by return mail.

Sauerman Scraper Excavator



Sauerman Scraper Stockpiler

Sauerman Slackline Cableway

SAUERMAN BROS., Inc.
530 S. Clinton St. Chicago 7, Illinois

Cableway and Scraper Specialists Since 1909

COMPLETE CRUSHING PLANTS
designed and equipped by FARREL-BACON

Farrel-Bacon provides a complete engineering service, including design of plant and supplying all equipment from primary crusher to bin gate. Jaw-type crushers are available in sizes from 60" x 48" to 10" x 7" *Write for complete information.*

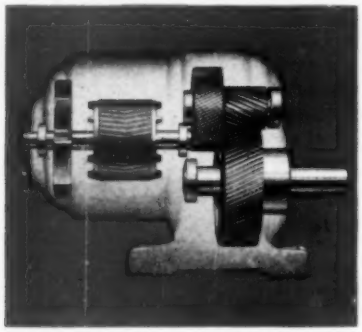
FARREL-BACON
ANSONIA, CONNECTICUT

BA-5

Tile Plant Increases Production 25%

Replacement of a worm gear drive on our Intensive Mixer with a Slo-Speed Electric Power Drive not only increased production 25% but also reduced power costs 58% and maintenance costs 75%, reports Mr. K. C. Sopp, Secretary-Treasurer of Pomona Tile Manufacturing Co., Pomona, Calif. Better machine performance has also had a very good influence on employee morale.

STERLING SLO-SPEED



OUTSTANDING FEATURES:

Simplified gear system — balanced design — compact — rugged — highly efficient — abundant lubrication — low output shaft — positive oil seals — Herringbone Rotor — protected — streamlined — direct through ventilation — quiet operation — AGMA speeds — extremely long life — every unit will operate in any position.

70 ILLUSTRATIONS showing how Sterling Electric Power Drives reduce production costs. Write for Bulletin No. D-115

STERLING ELECTRIC MOTORS

Plants: New York City 51; Van Wert, Ohio; Los Angeles 22; Hamilton, Canada; Santiago, Chile
Offices and distributors in all principal cities

Gar Wood Industries, Inc., Wayne, Mich., announces the appointment of Arthur F. Dries as manager of sales promotion and advertising for the Findlay, Wayne, St. Paul, Richmond and National Lift divisions.

Koehring Co., Milwaukee, Wis., has announced the election of J. R. Steelman as president and E. A. Brugger as vice-president and general manager. Mr. Steelman succeeds G. E. Long who remains as chairman of the board. He became associated with the Koehring organization in 1936, serving as sales manager and then president of C. S. Johnson Co., a subsidiary, joining Koehring Co. as vice-president in charge of sales in 1943. Mr. Brugger has been with Koehring Co. for 35 years, serving as assistant purchasing agent until 1930 when he was named director of purchases. He transferred to the Parsons Co. a subsidiary in Newton, Iowa, in 1938, and served as president and general manager for a period of ten years. Late in 1948 he returned to Koehring to become vice-president in charge of production.

J. R. Steelman

E. A. Brugger

Bucyrus-Erie Co., South Milwaukee, Wis., has appointed Ray-Brooks Machinery Co., Inc., Montgomery, Ala., as distributor in southern Alabama and part of Florida west of the Apalachicola river. Tractor & Equipment Co., Inc., Birmingham, Ala., has been named distributor in northern Alabama.

C. H. Wheeler Mfg. Co., Philadelphia, Penn., announces that the Economy Pump Division of Hamilton-Thomas Corp., Hamilton, Ohio, has consolidated with the C. H. Wheeler Mfg. Co. Production, engineering and sales departments of Economy have been moved from Hamilton, Ohio, to the Philadelphia plant, and Economy pumps will in the future be known as Wheeler-Economy pumps.

B. F. Goodrich Co., Cleveland, Ohio, announces that John R. Hoover has been elected president of B. F. Goodrich Chemical Co. He was formerly vice-president of sales and succeeds William S. Richardson, who is vice-president of the parent company as well as the chemical firm.

H. K. Porter Co., Inc., Pittsburgh, Penn., has elected H. M. Sossaman as vice-president in charge of commercial development, Quaker Rubber Corp., a division of the company. He was formerly general sales manager and will be succeeded in this position by J. R. Lewis, assistant general sales manager.

De Laval Steam Turbine Co., Trenton, N. J., has announced the formation of a subsidiary corporation, the De Laval Turbine Pacific Co., with headquarters in San Francisco, Calif. Officers include G. W. Smith, Jr., chairman; J. P. Stewart, president; C. F. Reeves, vice-president and general manager. Branch offices are located in Los Angeles, Calif., under H. H. Reynolds, district manager, and Seattle, Wash., under J. A. Greenland, district manager.

New York Belting and Packing Co., Passaic, N. J., has appointed the following district sales managers and factory representatives: Carl G. Link, Jr., northern district sales manager covering the states of Iowa, Indiana, Illinois, northwestern Pennsylvania, northern Ohio, southern Wisconsin and northern New York; William I. Butler, southeastern district sales manager covering all of the southeastern section of the country from the Mississippi to the Atlantic Coast, with headquarters in Memphis, Tenn.

The Baker-Raulang Co., Cleveland, Ohio, has announced the appointment of John A. Borman as chief engineer. Maynard W. McMillan has been appointed representative for Cincinnati, Hamilton, Middletown, Dayton, Springfield and Portsmouth in Ohio, Covington and Newport in Kentucky, and Lawrenceburg in Indiana, with headquarters in Cincinnati. Amory N. Mumma, district representative in Philadelphia, has opened an office in Baltimore, Md., with Edward G. Matthew as manager.

Detroit Automotive Products Corp., Detroit, Mich., announces the appointment of I. M. Hagglund as manager of the sales department and G. W. Pollard as service manager.

Fruehauf Trailer Co., New York, N. Y., is erecting a new branch plant at Wallingford, Conn., to replace the New Haven branch. Paul J. Motto, who is in charge of the New Haven plant, will be manager of the Wallingford branch.

Union Bag and Paper Corp., New York, N. Y., announces the appointment of Alexander Calder, Jr., as executive vice-president and general manager. He was formerly vice-president and assistant to the president. H. S. Daniels, who will shortly complete his services as consultant to the O.P.S. in Washington, will assume the direction of all sales as executive vice-president and general sales manager, succeeding James L. Knipe, who has resigned but will continue as a director.

Westinghouse Electric Corp., Pittsburgh, Penn., announces that H. H. Hanft has been named assistant to the manager of the industrial department. He was formerly a section manager of the transportation sales department.

NO. 1
OF A SERIES
ON HOW TO

Stretch a MULTIWALL Paper Bag

It is just good business to get the best possible use from your multiwalls. Here is one way to do it . . .

Keep Storage Rooms Humid:

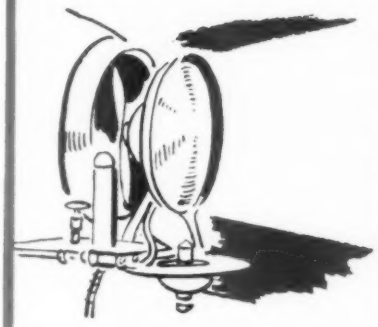
1. Let steam escape in bag storage room to keep air and bags humid. Keep a humidity indicator in the storage room and check it frequently. Always leave aisles or spaces between stacks of bags to allow circulation.

2. Store bags on dunnage, away from floor, and keep floor wet so moisture can be absorbed into air. A relative humidity of about 50% at warm temperature is best.

3. Drill small "needle" holes in horizontal water pipes. Hang cloths over holes. Air absorbs moisture from wet cloths.

4. Hang wet cloths over edge of water barrels. Cloth absorbs water and air absorbs moisture from cloth. Keep barrels well filled.

5. Open windows on damp or rainy day. Damp outside air will circulate in the bag storage room. Multiwalls are strongest when moisture content of the paper is about 6 or 7%.



6. Use commercial humidifying apparatus. Many types of commercial humidifiers are available with capacities to suit individual requirements.

Want the Whole Story?

Ask your Bemis Man for free, illustrated copy of Bemis Multiwall Packaging Guide. It deals with Storage, Filling and Closing, Handling, Palletizing and other important subjects.

• • •

If you need cotton or burlap bags also, Bemis is your best source.

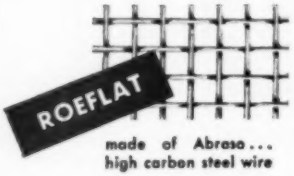
Bemis

BEMIS BRO BAG COMPANY

St. Louis 2, Missouri

AGGREGATE WIRE SCREENS

Roebling offers the right metal or alloy for extra economy



made of Abraso... high carbon steel wire

made of Roetemp... oil-tempered steel wire

available in stainless steel, monel and other alloys

WHETHER ROEBLING ROEFLAT or some other construction best meets your screening requirements, Roebling goes a long step farther... offers you each and every construction in the exact metal or alloy to bring maximum screen life and economy in your operations.

As one example, the vastly increased working life afforded by Roebling Roeflat's unique construction can be boosted still further by adopting Abraso, for its high resistance to vibration fatigue; Roetemp, for abrasion and fatigue resistance; stainless steel, monel or other alloys to overcome corrosion problems.

Get the whole Roebling Aggregate Screens story... write for Catalog W-903.

WOVEN WIRE FABRICS DIVISION

John A. Roebling's Sons Company
Roebling, New Jersey

Woven Wire Fabrics Division
John A. Roebling's Sons Co., Roebling, N. J.
Gentlemen: Please send me free copy of Catalog W-903 giving up-to-the-minute information about Aggregate Screens.

Name.....
Company.....
Address.....
City.....State.....

ROEBLING

Bucyrus-Erie Co., South Milwaukee, Wis., announces that a larger stock of replacement parts for excavators, drills and tractor equipment is provided for at the new western headquarters in South San Francisco, Calif., also a larger inventory of tractor equipment units. J. H. Sackett is western sales manager, H. L. Livingston and H. E. Lowe, sales representatives, and A. O. Belding, service engineer of the excavator division. H. R. Langford is district representative, John Carlile, and W. O. Blattner, sales representatives and Ralph Bickers, L. L. Brown and R. E. Jephson, service engineers of the tractor equipment division.

Dewey & Almy Chemical Co., Cambridge, Mass., has appointed Arthur B. Summers as sales engineer in the eastern states for Darakote, an anti-stripping compound, with offices at White Plains, N. Y. Frank D. Gaus has been named sales engineer in the West, with headquarters at the plant in San Leandro, Calif.

Concrete Specialties Mfg. Co., Dubuque, Iowa, under agreement with Adrian Peerless Corp, Adrian, Mich., plans to manufacture Wal-Lok, a fabricated steel mesh for use in horizontal mortar joints of masonry walls, for the states of Iowa, Illinois, Minnesota, Missouri and Wisconsin.

Kent Machine Co., Cuyahoga Falls, Ohio, has discontinued its Detroit agency representative. Sales will henceforth be handled from the home office by Dan Urban, sales manager, and his assistants.

Nordberg Mfg. Co., Milwaukee, Wis., has appointed the Eighmy Equipment Co., Rockford, Ill., as distributor for Nordberg 4FS diesel engines in the northwestern and central sections of Illinois.

Caterpillar Tractor Co., Peoria, Ill., has announced the retirement of John V. Munro, vice-president of the company, with which he has been associated since 1925. Mr. Munro joined C. L. Best Co., San Leandro, Calif., a predecessor of Caterpillar, in 1920 as purchasing agent, and moved to Peoria in 1925 as purchasing agent and became vice-president of Caterpillar in 1926.

American Brake Shoe Co., New York, N. Y., announces that William M. Black has been appointed president, and Joseph L. Mullin, vice-president, of the electro-alloys division. Walter G. Hoffman, formerly president of the division, has been appointed assistant to the vice-president for research and development of American Brake Shoe. Mr. Black is a vice-president of American Brake Shoe and also president of the American Manganese Steel Division. Mr. Mullin is vice-president in charge of operations for the American Manganese Steel Division. Mr. Hoffman will be assigned to special metallurgical development projects at the Research Center in Mahwah, N. J.

FOR BIG LIFT OPERATIONS...

specify HERCULES *Red Strand* Preformed for the extra *tough* jobs. It stands up better on draglines, derricks, scrapers, shovels and all other equipment. Fewer replacements—less downtime with HERCULES *Red Strand* Preformed.

LESCHEN WIRE ROPE

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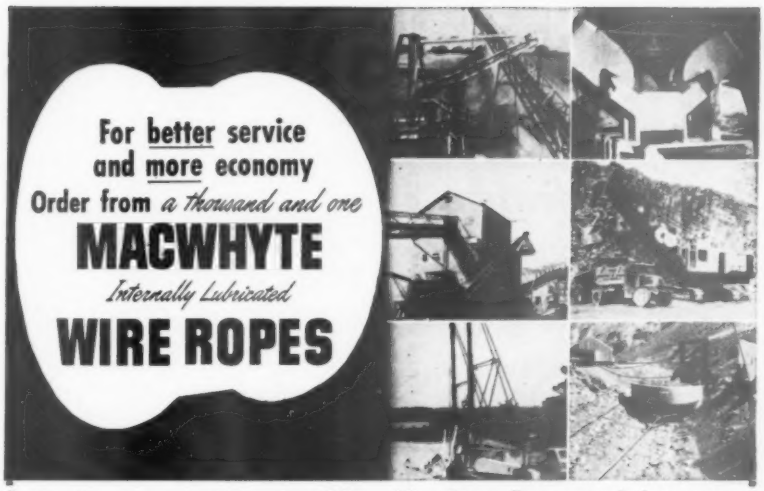
Lincoln Electric Co., Cleveland, Ohio, announces that William Irrgang has been elected executive vice-president of the company. He has been with the firm since 1929 and for the past 23 years has been engaged in various phases of plant operation.

Allis-Chalmers Mfg. Co., Milwaukee, Wis., has appointed Joseph S. Quinn, Floyd B. Younginer, Malcolm Jones and Robert F. Morgan as sales representatives in the St. Louis, Chattanooga, Denver and Syracuse district offices, respectively, of the general machinery division.

Thermoid Co., Trenton, N. J., has appointed Eric O. Ridgway as director of research and development. In 1936 Mr. Ridgway formed his own chemical research company and later, in partnership with others, he formed Ridbo Laboratories, Paterson, N. J. Thermoid has acquired controlling interest in Ridbo, including patents on rubber compounding materials, drying oil properties and rosin acid derivatives used in synthetic rubber and the synthesis of hormones.

Caterpillar Tractor Co., Peoria, Ill., announces an expansion program that will include a new factory in York, Penn., extensive additions to the Joliet, Ill., plant, and some improvements in the Peoria plant. Announcement has also been made of the appointment of Edward Crossley Lipman as a director of the company. Mr. Lipman is president of The Emporium Capwell Co., San Francisco.

General Electric Co., Schenectady, N. Y., announces that John W. Belanger has been appointed vice-president and general manager of the defense products division. Nicholas M. DuChemin, who was recently placed in charge of the manufacturing services division, has also been elected vice-president. Sam Littlejohn, formerly manager of the Atlantic district office of the apparatus organization in Philadelphia, has been named commercial vice-president, with headquarters in Cleveland. Arthur W. Bartling, who has been general sales manager of the small apparatus division, has been appointed manager of product sales practices for the apparatus sales division, with headquarters in Schenectady, N. Y. Francis K. McCune, formerly manager of engineering of the large apparatus division, has been named assistant manager of the engineering services division. F. Charles Ruling has been appointed manager of the Atlantic district of the apparatus sales division, which covers the states of Virginia, West Virginia, Maryland, and Delaware, most of Pennsylvania, and portions of New Jersey, North Carolina, and Ohio. His headquarters will be in Philadelphia. Mr. Ruling was formerly manager of the apparatus sales office in Washington, D. C., and will be succeeded in this position by James J. Fitzgibbon, who has been manager of the Charleston, W. Va., office since 1949.



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2949 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal and Stainless Steel Wire Rope. Catalog available on request.

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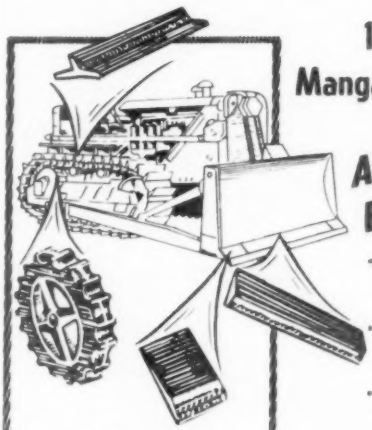

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Cummins Engine Co., Inc., Columbus, Ind., announces that Raymond H. Snyder, former president and treasurer, Snyder Aircraft Division, Air Associates, Chicago, Ill., has purchased certain assets of the Chicago operation of Cummins Diesel Sales Corp., and will operate as an independently owned Cummins dealership with the new name of Cummins Illinois Engine Sales, Inc., covering 22 counties of northern Illinois, Scott county, Iowa; and Lake, Porter and LaPorte counties in northern Indiana. Announcement has also been made that the operations at Milwaukee, Wis., and Peoria, Ill., now will operate as individual dealerships of Cummins Diesel Sales Corp. Peoria territory includes that part of Illinois bounded on the north by and including the counties of Mercer, Knox, Stark, Putnam, Marshall, Livingston, Ford, and Iroquois and bounded on the south by but not including the counties of Calhoun, Green, Macoupin, Montgomery, Fayette, Effingham, Jasper, and Crawford. E. E. Sandtner has been appointed manager.

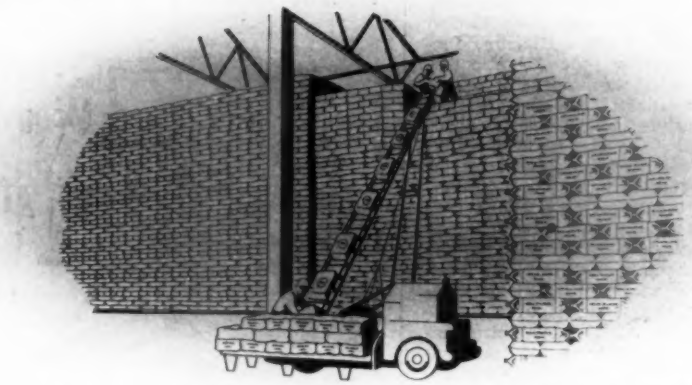
The territory of Cummins Diesel Sales Corp., Milwaukee, includes the upper Michigan peninsula with the exception of the county of Gogebic; and the state of Wisconsin, with the exception of the counties of Iron, Ashland, Bayfield, Douglas, Washburn, Burnett, Polk, St. Croix, Pierce, Pepin, Buffalo, Dunn, and Trempealeau. R. R. MacDonald has been appointed manager.

Central and eastern portions of Iowa, with the exception of Scott county, Iowa, have been transferred to Cummins Diesel Sales Corp., with headquarters at Omaha, Neb. W. D. Blizzard has been named manager.

Worthington Pump & Machinery Corp., Harrison, N. J., has announced the following appointments: J. B. Laramy, manager of the marketing research department; George P. Passmore, assistant to the vice-president in charge of manufacturing at Harrison, N. J.; A. M. Tullo, works manager at the Wellsville, N. Y., plant; John Burlick, assistant to works manager at Harrison plant in charge of industrial engineering; Max A. Heyman, assistant to works manager at Harrison plant in charge of production control; W. D. Sizer, manager of regional engineering and service department; George F. Habach, executive engineer at Harrison plant; and Everett Schmachtenberg, chief engineer of the centrifugal engineering division at Harrison plant.

Bradley Pulverizer Co., Allentown, Penn., announces that Peter B. Bradley, son of the president, has been appointed assistant managing director to William A. Gibson, vice-president and managing director. Mr. Bradley was formerly associated with the London branch of the company.

Much more goes into HAMMOND *Multi-Wall* BAGS than the Products they dependably carry



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1. Papers and materials of highest quality are used in Hammond Multi-Walls.
2. Hammond's two large plants are devoted almost exclusively to Multi-Wall Bag production.
3. Pride of workmanship—thorough knowledge of your shipping problems assure you of finest Bags for your needs.
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CONCRETE PRODUCTS

A SECTION OF ROCK PRODUCTS

ONCRETE UNITS · READY-MIXED CONCRETE

Machinery exposition at the N.R.M.C.A. and N.S.G.A. February convention

Products manufacturers report

LESS BREAKAGE WITH DURAPLASTIC*

If your profits picture on concrete products shows too much breakage, here's good news: Many users of Atlas Duraplastic Cement report definite reductions in breakage of green products during handling . . . fewer culls and throwbacks . . . clean-cut, truer edges and corners. Another reason you should get acquainted with Duraplastic Cement: It makes a more cohesive, "rubbery" mix which holds together better . . . feeds easily through machines. Small wonder Duraplastic is preferred for concrete block, brick, pipe, drain tile, silo staves and other machine-made products.

YET DURAPLASTIC COSTS NO MORE

It sells at the same price as regular cement and requires no unusual changes in procedure. Complies with both ASTM and Federal Specifications. Send for complimentary booklet with detailed information. Address Universal Atlas Cement Company (United States Steel Corporation Subsidiary), 100 Park Avenue, New York 17, N. Y.

*"Duraplastic" is the registered trade mark of the air-entraining portland cement manufactured by Universal Atlas Cement Company

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A UNIVERSAL ATLAS PRODUCT

Makes Superior Concrete Products at No Extra Cost

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INDUSTRY NEWS

Ready-Mixed Concrete Subject to Renegotiation

NATIONAL READY MIXED CONCRETE ASSOCIATION in a recent memorandum has explained the renegotiation status of ready-mixed concrete sales under the Renegotiation Act of 1951 and the tentative regulations promulgated under the act. There is no provision in either the act or the tentative regulations which provides for the exemption of ready-mixed concrete from renegotiation. Neither is it possible to obtain an exemption similar to the World War II exemption as that exemption was based on the "standard commercial articles" provision of the 1943 act, and Congress refused to include a comparable provision in the 1951 act. However, it is hoped that in later issues of the 1951 regulations, some form of exemption may still be obtained under other provisions of the act.

As the act now stands, profits from sales of ready-mixed concrete under prime contracts with defense agencies, or under subcontracts under such prime contracts, are subject to renegotiation if the receipts or accruals under such contracts amount to more than $250,000 in any fiscal year beginning on or after January 1, 1951 (or to a ratable portion of $250,000, in the case of fiscal years ending during the calendar year 1951). If a ready-mixed concrete producer has defense contracts and subcontracts which, for example, total $300,000 in any fiscal year, he will be renegotiated on $50,000 only. The $250,000 exemption applies in every case, which will automatically exclude many producers from the obligation to renegotiate.

Stockholders' Meeting

STOCKHOLDERS of the Marietta Concrete Corp., Marietta, Ohio, elected three new officers at their annual meeting, held recently at the company offices in Westview. F. Leonard Christy was elected vice-president, director of sales and advertising and director; R. Neil Christy, vice-president, production engineer and director; and C. K. Smith, treasurer and director. Officers re-elected included Frank L. Christy, president and director; C. B. Ross, vice-president, in charge of the Baltimore, Md., plant, and director; Frank J. McCauley, vice-president; Charles D. Fogle, Sr., secretary and director; and J. D. Ross, plant manager of the Baltimore plant and director.

Gross sales for the company in 1951 were reported to be considerably higher than in 1950, with an increased sales output expected in 1952. Employe benefits have also increased. During 1951, the pension trust plan which has been in effect and maintained by the company since 1940, was revised to include additional benefits for continuous-service employes. Another increase was in the payroll which, for the first time in company history, was in excess of $1,000,000 for the year.

Expands Facilities

BOLENDER BRICK AND MATERIAL CO., producer of concrete block and brick, drain tile, sewer pipe and septic tanks, recently expanded its facilities at Oklahoma City, Okla., with the purchase of the ready-mixed concrete plant of Midwest Concrete Co.

The company is also manufacturing a new concrete brick which is produced in both the standard 4- x 8-in. size and in double length. At present, there are said to be only three such brick-making machines in the United States.

Earl Bolender, president, founded the business in 1935, employing two persons. Since then the company has expanded to an organization employing from 40 to 52 people.

Steam Curing of Concrete

THE NATIONAL CONCRETE MASONRY Association, with the permission of the Cement and Concrete Association of London, England, has reprinted a number of copies of a technical paper, "Principles Underlying the Steam Curing of Concrete at Atmospheric Pressure," written by A. G. A. Saul, and which was originally published in the March, 1951, issue of *Magazine of Concrete Research* (England).

The article contains much valuable technical information which is worth careful study by block manufacturers employing steam curing at atmospheric pressure. The conclusion was reached that an excessively rapid rate of initial temperature rise is detrimental to the strength attained by the concrete which, in general, corroborates the experimental data and recommendations contained in N. C. M. A.'s Technical Reports No. 2 and 13, regarding the desirability of an adequate minimum holding or presetting period and a temperature rise rate, after steaming is started, not to exceed about 60 deg. F. per hr.

Cover Picture

IN CONJUNCTION with the 22nd annual meeting of the National Ready Mixed Concrete Association and the 36th annual meeting of the National Sand and Gravel Association, February 11-15, in Chicago, Ill., was the machinery exposition that is held every even year. It was one of the largest and finest displays of equipment and accessories for both industries that has been exhibited to date and was well attended.

Exhibits were on display not only in the main exhibit hall of the Conrad Hilton Hotel, but in the exhibit hall lobby, on the mezzanine floor and in parking lots adjacent to the hotel.

FOSTER CONCRETE AND BUILDING SUPPLY CO., Bowling Green, Ohio, is installing equipment for the production of concrete drain tile. The company will continue its line of general building supplies, ready-mixed concrete and coal.

A TWO-DAY SCHOOL on concrete, sponsored by the Marshall College engineering department and the Portland Cement Association, was held at Huntington, W. Va., February 12-13, 1952. Topics discussed dealt with new developments in design and handling of concrete mixes.

VANDER HEYDEN, INC., Milwaukee, Wis., is celebrating its 40th year in business. The building supply firm, which specializes in Waylite block, was founded in 1912 by J. Vander Heyden, president of the company.

BESSER MANUFACTURING CO., Alpena, Mich., is installing two newly developed concrete roof tile machines at the plant of Industrias Betonitte De Artefatos Limetada, Rio de Janeiro, Brazil. One of the machines being installed is for the manufacture of French-type concrete roof tile; the other, Spanish-type.

OSAKIS CONCRETE PRODUCTS CO., Osakis, Minn., has been sold to Dan A. Fraser and Homer Peterson, who have formed a partnership. Former owner was Joe Rutten. Plans are being made to produce 8- x 8- x 12-in. block in addition to the 5- x 8- x 12-in. now being produced. The company also produces dry-tamp silo staves and Ribstone silos.

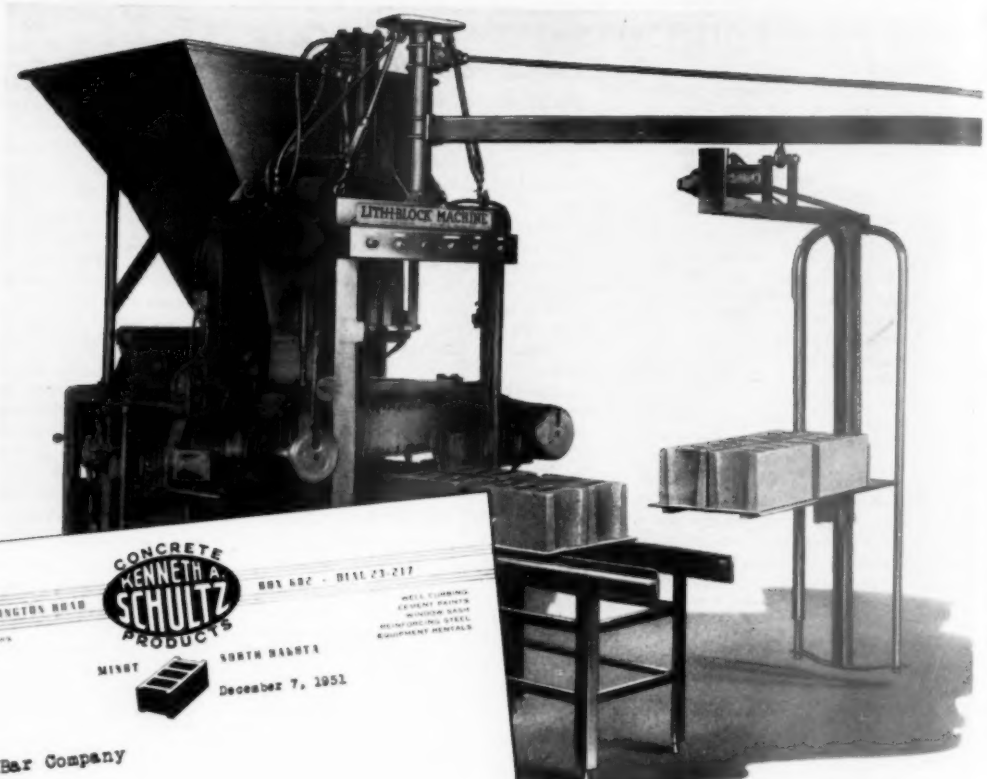
UNIVERSAL CONCRETE PIPE CO., Columbus, Ohio, recently sponsored a "general management" conference at the Seneca hotel, Columbus. The conference was attended by more than 80 plant managers, superintendents and sales representatives. Hector Eschenbrenner, Jr., vice-president of Universal, served as conference chairman. Guest speakers included Joseph Miller, president of Lewistown Pipe Co., Chicago, Ill.; M. W. Loving, consulting concrete specialist, Chicago, Ill.; and C. M. Howard, engineer-manager, Concrete Products Association, Seattle, Wash.

J. D. FISCHER, Pipestone Concrete Products Co., Pipestone, Minn., recently announced that L. Proumen, engineer, Shakopee, Minn., has joined him in partnership in his concrete products business.

PERRUCCI BROTHERS, which operates a ready-mixed concrete plant at South Plainfield, N. J., has begun operations at its new limestone quarry and plant at Oxford, N. J., on the former Edison Cement Co. property.

RYBAK READY-MIX CONCRETE CO., Oil City, Penn., recently purchased additional property for expansion purposes, which will include both office and plant facilities. The company plans to produce concrete block in addition to its ready-mixed concrete business.

LITH-I-BLOCK PRODUCE BETTER BLOCK- FASTER - AT LOWER COST



CONCRETE
KENNETH A. SCHULTZ
PRODUCTS

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MIAMI NORTH MIAMI

December 7, 1951

Lith-I-Bar Company
Holland
Michigan

Gentlemen:

You will probably be interested in the production record of my second Lith-I-Block machine installed this spring.

I am pleased to say that the machine has consistantly operated above your advertised production figures of 480 eight inch units per hour. Our average is 540 units and we have made as many as 640 eight inch units per hour.

High production and low maintainance combined with a superior product have reduced wasted labor hours and cull blocks to a point where we are confident we can compete with any producer in the concrete products field.

Yours very truly,

Kenneth A. Schultz

The Proven Leader In Plants From Coast To Coast. If you want to increase production, lower labor costs and improve the quality of your block . . . this is it. Lith-I-Block machines, in both 2 and 3 block models, have consistently produced more than rated capacity day after day in leading plants from coast to coast without costly down-time. Lith-I-Block users report amazingly small labor costs . . . lower than anything they have ever known. And Lith-I-Block quality is visibly better . . . the kind of superior block that builds sales ***fast.***

WRITE FOR THE LITH-I-BLOCK STORY AND THE NAMES OF NEARBY LITH-I-BLOCK PRODUCERS TODAY!

LITH-I-BAR COMPANY

Ready-Mixed Concrete Industry Sets All-Time Record Production

National meeting stresses merchandising and looks to future; also considers price controls, priorities, employe relations, safety and admixtures

THE 22ND ANNUAL convention of the National Ready Mixed Concrete Association, held simultaneously with the 36th annual convention of the National Sand and Gravel Association, the week of February 11 in Chicago, Ill., stressed merchandising, price controls, priorities, wage and salary regulations, employe relations, safety and the use of admixtures in concrete. In addition, concrete, highways, concrete in pavements and other subjects were covered in joint sessions with N.S.G.A.

Many of the papers, reports and discussions on matters of interest to both industries are reported in coverage of the N.S.G.A. meeting presented separately in this issue of ROCK PRODUCTS. The convention was featured by the largest and most comprehensive machinery exposition in history.

President's Address

President Norman J. Fredericks, in his opening address before a joint session of N.R.M.C.A. and N.S.G.A., summarized the current position of the association and reported on some of the highlights of the past year.

He had a favorable report to present on membership and on financial status of the association. Surplus of the association was the highest in history at the end of the year and a record number of new members was obtained. Seventy-one regular members and 13 associate members were added and membership now totals 500 regular and 73 associate members. Forty-seven states and a number of foreign countries are represented in the membership.

All previous production and sales records were broken in 1951 when the industry produced and sold an estimated 38,000,000 cu. yd. of concrete valued at nearly one-half billion dollars. In the production of concrete, the industry processed and handled approximately 66,000,000 tons of aggregates and some 50,000,000 bbl. of portland cement. Thus, about 20 percent of all cement sold during the year was to the ready-mixed concrete industry.

Mr. Fredericks touched upon the hardships imposed on the industry by government regulations, due to lack of information and lack of understanding of its problems and how these problems are being met effectively through the National Ready Mixed Concrete Association. As an example, he told how the association functioned, in the face of government opposition, to obtain price relief from O.P.S. to compensate for increased costs necessitated by the industry having to purchase out-of-area cement. He also commented on the efforts now underway to secure price relief to compensate for increased transportation costs and other increases.

To emphasize all that is being done by the association in the interests of the membership he mentioned how the association during the year has presented industry problems and viewpoints to the Senate, House of Representatives, the Collector of Internal Revenue, the W.S.B., S.S.B., N.P.A., O.D.M., I.C.C., N.L.R.B., the F.T.C., etc., with which, otherwise, individual companies would be involved at great expense.

Aside from representation before government agencies he summarized the many activities of the staff in furnishing information to guide producers in making wise and effective decisions necessary to the conduct of their businsses, and mentioned the individualized service available to members in the solution of special problems.

Mr. Fredericks discussed the group insurance plan which will be made available to member companies within a few months. Adoption of the plan will, of course, be optional, it having been drawn up for the particular benefit of the smaller producer.

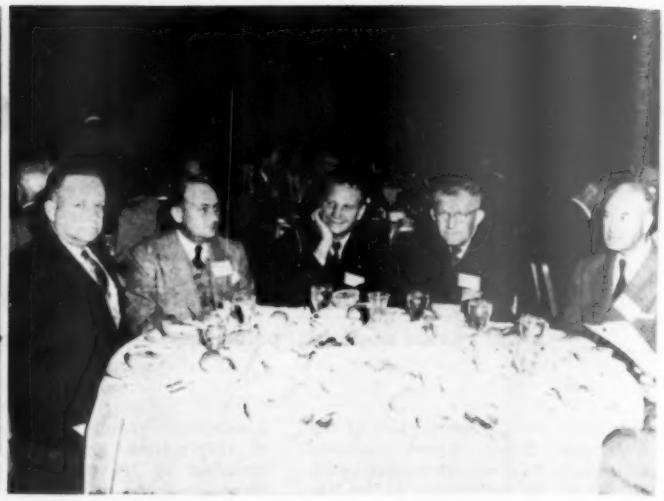
In conclusion, he gave the bulk of credit for accomplishments of the association to executive secretary V. P. Ahearn and director of engineering Stanton Walker and to the staff, officers, directors and members of the association.

Construction Activity

Speaking before the opening joint session of N.S.G.A. and N.R.M.C.A., John L. Haynes, director, Building Materials Division, N.P.A., spoke on the requirements of the defense program in their effects on construction in 1952.

In his opening remarks, he re-

Newly elected officers of National Ready Mixed Concrete Association are, l. to r., Herbert G. Johncke, Johncke Service Inc., New Orleans, La., vice-president; Richard K. Humphries, Pacific Coast Aggregates, Inc., San Francisco, Calif., president; Robert C. Collins, Warner Co., Philadelphia, Penn., vice-president; and Louis C. Shilling, I. E. Shilling Co., Miami, Fla., treasurer



Left: Robert C. Collins, Warner Co., Philadelphia, Penn., left, and Quentin Best, Consolidated Rock Products Co., Los Angeles, Calif., answer questions following a panel discussion. Right: At the joint luncheon of N.R.M.C.A. and N.S.G.A. were, l. to r., Harold M. Lacy, Dallas Concrete Co., Dallas, Texas; J. Howard Wilson, Gifford-Hill & Co., Dallas, Texas; Fred Fanning, Dallas Concrete Co.; C. G. Thompson, Coastal Plains Supply Co., Shreveport, La.; and E. A. Tucker, Trux Mix Concrete Co., Longview, Texas

minded that the governing idea in Washington was that the country is in danger and that the building of a war machine will continue to have first call on materials. The international picture has not changed, to alter the pattern of preparedness, since emergency regulations first went into effect.

The N.P.A., he said, runs a "licensing system" for construction and delegates certain authority to other agencies, among them the Bureau of Public Roads and the Home Finance Agency as examples. The N.P.A. and some 40 other agencies are subsidiary to D.P.A. from which it must apply for its allotments of materials.

As far as materials are concerned, he said that requests are running about 150 percent of supply and, as a result, not even the military is getting all its requirements. He explained how the supplies of materials are divided up, which is on the basis of some relationship with existing practices. The copper and brass situation is very bad and supply is actually about one-third of needs.

The sand and gravel industry comes under the Defense Minerals Procurement Division while ready-mixed concrete is under the jurisdiction of the Building Materials Division. He reminded that priorities for plant expansion mean that materials must be taken from one user to give to another.

Commercial construction has been cut back much, he said, and will continue to be cut because it is necessary to build aluminum and other war plants first. Hospital and school construction have even been cut for that purpose. In any construction, he said, a chain reaction is started that requires the building of sewers, gas lines, etc., all of which drain further materials in short supply.

Labor Litigation

F. E. Schouweiler, Old Fort Supply Co., Fort Wayne, Ind., in a talk given before a joint session of N.R.M.C.A. and N.S.G.A., described the conditions which led to his filing a suit against the Common Laborers Union, A.F.L., for damages to his company. The union had attempted to impose a discriminatory labor rate to discourage the use of ready-mixed concrete. When finally brought to trial, the jury returned a verdict in favor of the company allowing the $21,000 damages sought. However, the case has not been settled yet and may not be for some time.

At the outset of his talk, Mr. Schouweiler emphasized that he had enjoyed satisfactory relations for many years until this situation. It started in 1948 when his company purchased an old plant in Muncie, Ind., which is an industrial city of about 60,000 people. The plant was set up for handling cement in sacks and required the employment of four or five laborers most of the time.

R. V. Roupe, Crown Concrete Co., Des Moines, Iowa, stops at the ROCK PRODUCTS display to admire the awards presented to producers in the National Sand and Gravel Association safety competition

Immediately, a new batching plant with bulk handling was purchased to improve production and to conserve labor. Friendly relations were established with the teamsters' and the operating engineers' unions but, after five weeks of operations, the laborers' business agent called and immediately threatened to run the company out of Muncie. He then attempted to have the plant manager sign a labor contract which was one made out for general contractors and which did not apply to ready-mixed concrete. The agent, in trying to force a signature, made it clear that he ran things in Muncie and could either help or hurt the company.

After much sparring around, it came out that the agent was planning to include in the agreement with the general contractors a special rate for ready-mixed concrete handlers at a premium of 35 to 50 cents an hour over common labor.

Having been successful in having the truck driver's union classify "helpers" in their contract, the company continued to operate although there were evidences of attempts to keep contractors from using the company's ready-mixed concrete.

In 1949, the contractors were pressured, under threat of strike, into signing a contract with the business agent calling for common labor at $1.40 per hour and ready-mixed concrete handlers at $1.75 per hour. The agent told the contractors, when presenting the contract, that it was in the interests of the local group to have a ready-mixed concrete handler's rate since it would work to the disadvantage of any out-of-town contractors who figured work in Muncie.

The company felt that it was being hurt by the discriminatory rate but the business agent insisted that the new classification was necessary because more skill was required in handlers of ready-mixed concrete and that it was the union's privilege to create new classifications where a differential in skill is required.

After a suit for damages was filed by the company, the business agent quieted down but was instrumental in slowing down any sizable job where ready-mixed concrete was used. The labor foreman on a particular job was told to hold up trucks on the job and labor would not fill a wheelbarrow more than half full, dump the concrete, etc.

Litigation was started in April, 1950, and it was not until October, 1951, that the company could get the union into court. Every known piece of strategy was used to keep the case from trial, the tactics being to exhaust the company. When the case did come to court, the trial lasted three days and the jury rendered the favorable decision in less than two hours.

The company has won the first round thus far, and the decision, according to Mr. Schouweiler, has at least served the purpose of proving that employers do have some rights if they are willing to fight for them.

Ohio Ready-Mixed Concrete Producers' Meeting

Each year at the national meeting, the Ohio Ready Mixed Concrete Association holds an interim luncheon meeting, and each year the greater attendance attests to its success. An overflow audience heard the secretary's interim report, a talk on the use of fly ash in ready-mixed concrete, and a preview of the concrete short course offered by the association in the middle of March. Herbert Rusk, president of the association, presided.

Russell P. Mumford, chairman of the short course committee, previewed the short course, held at the University of Akron, March 12-14. The course was primarily for employes responsible for batching and dispatching, and was not very technical, Mr. Mumford reported. The objective was merely to teach the basic principles of making good concrete.

N.R.M.C.A. past president Norman J. Fredericks, Koenig Coal & Supply Co., Detroit, Mich., left, congratulates president-elect Richard K. Humphries, Pacific Coast Aggregates, Inc., San Francisco, Calif.

The interim report presented by the secretary, Claude L. Clark, disclosed that there are now 87 members in the association and 24 associate members.

The principle speaker of the meeting was C. M. Weinheimer, head, Engineering Laboratory and Research Department, Detroit Edison Co., Detroit, Mich. Mr. Weinheimer began his talk on the use of fly ash in ready-mixed concrete with an historical survey of fly ash recovery. It was used in portland cement before 1910, but not until 1923 when Detroit Edison built the Trenton Channel plant was it collected in quantity by means of electric precipitators. Since then tonnage collected has increased to approximately 3,000,000 tons in the U. S. in 1951. Most of this was collected east of the Mississippi river.

Mr. Weinheimer discussed the properties and collection of fly ash in some detail. It has pozzolanic properties but no cementitious properties, though when mixed with water in the proper concentration some free lime is liberated, the amount of which varies. The material has the property of changing lime to an insoluble form with cementitious properties, giving lower permeability and more strength. Fly ash also has these advantages, Mr. Weinheimer said, for it improves plasticity and weather resistance, and reduces bleeding, segregation, drying shrinkage and expansion. The use of fly ash requires the addition of more air-entraining agent because of the increased surface area of the pozzolan.

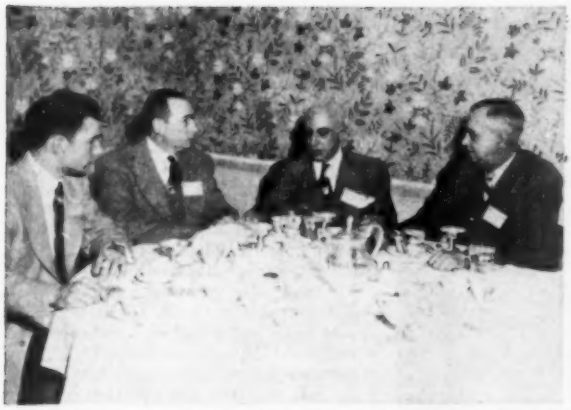
Some cements are delivered blended with fly ash, though usually the fly ash is blended at the batching plant. Handling methods are the same as with cement; pneumatic transfer devices are very satisfactory, the speaker said. Similarly, bulk cement trucks and cars can be used for delivery. All these methods are for handling dry fly ash, though Mr. Weinheimer mentioned that if a moist handling method could be developed, a better grade might result. Dry fly ash, packed on a bagging machine, weighs 65 lb. per cu. ft., in a box and shaken, 50-55 lb. per cu. ft.

Though there are many other suitable pozzolanic materials, Mr. Weinheimer said fly ash's competitive advantage is its wide production, abundant source and low shipping cost.

However, he cautioned against using a poor grade of fly ash. It is produced as a result of burning pulverized coal, resulting in a carbon content of about 4 percent. Stoker ash is not acceptable because of its high carbon content —over 50 percent.

Mr. Weinheimer suggested additional precautions to be taken before any producer begins the use of fly

Left: Checking over the machinery displays are Mr. and Mrs. H. J. Bellamy, left, and Mrs. Paul Swanson, all of Concrete Materials Co., Waterloo, Iowa. Right: (l. to r.) Robert Mitchell, Consolidated Rock Products Co., Los Angeles, Calif.; Ezra C. Knowlton and Eric C. Ryberg, Jr., Sand and Gravel Products Corp., Salt Lake City, Utah, compare program notes



Left: Gathered at the luncheon for producers interested in state and district associations were, l. to r., A. K. Owen, Piedmont Construction Co., Winston-Salem, N. C.; Richard A. Bradshaw, L. S. Bradshaw & Sons, Salisbury, N. C.; Ernest Horne, Ready Mixed Concrete Corp., Indianapolis, Ind.; and Elbert F. Lewis, F. D. Lewis & Son, Inc., Greensboro, N. C. Right: (l. to r.) T. W. Murray, Huron Portland Cement Co., Detroit, Mich.; D. H. Deacon, Universal Atlas Cement Co., Dayton, Ohio; and William E. Whitelaw, Merkle Gravel Co., Oxford, Ohio, were among those present at the Ohio Ready Mixed Concrete Association luncheon

ash as an additive. The supplier should have an adequate daily supply (Detroit Edison, he said, produces 600 t.p.d. and has 6500 tons daily storage capacity.) The material should be uniform in carbon content and particle size. It should be obtained from a single plant, and even then the producer should organize his own experiments with his equipment and aggregates to determine yield and strength characteristics.

Equipment Displays

Approximately 100 manufacturers exhibited latest equipment and accessories at the machinery exposition held in conjunction with the combined convention. Each exhibit had plentiful information available in the form of catalogs, specifications and technical literature on each product and, where possible, full size equipment was displayed; otherwise, operating scale models and job photographs presented the features of each machine.

Not only did new basic items of equipment receive attention, but the exhibits also emphasized all types of accessories and replacement parts. Means of cutting maintenance and operating costs and prolonging the life of equipment was a major part of almost every display.

Of special interest to ready-mixed concrete producers were the displays of truck mixers, agitators and non-agitating bodies, batching and mixing plants, cement handling equipment, technical literature on various types of air-entraining agents and other admixtures, joint seals and joint materials, forming systems and steam generators. Various types of air meters for air-entrained concrete were also on display.

Literature covered such subjects as waterproofing, ways to better concrete construction, air entrainment, cement dispersion, producing uniform concrete, use of calcium chloride, tips on hot weather concreting, and also tips on placing concrete at temperatures below 50 deg. F.

MERCHANDISING PROBLEMS

A PANEL DISCUSSION of merchandising problems in the ready-mixed concrete industry was opened by Robert C. Collins, presiding officer. His remarks touched on the old question of available cement supply. The text of a note to the Secretary of Defense and to the Defense Production Administration requesting equitable distribution of cement and other materials was read. Getting closer to home, Mr. Collins said that it is bad business to expect a cement company to supply cement during a producer's peak season only.

The panel consisted of Q. W. Best, Consolidated Rock Products Co., Los Angeles, Calif.; John B. Donovan, Valentine Concrete Co., Inc., Springfield, Mass.; Russell P. Mumford, The Beckley & Myers Co., Springfield, Ohio; and M. Eugene Sundt, Albuquerque Gravel Products Co., Albuquerque, N. M.

Mr. Best discussed the marketing of lightweight aggregates in California. Lightweight construction there falls into three categories, Mr. Best said: (1) precast masonry units (aggregates used include Rocklite, Haydite, pumice, scoria), (2) plastering where heavy construction is not necessary (vermiculite and perlite used) and (3) structural grade concrete. Lightweight concrete must sometimes be sold to the architect and engineer, for they are charged with the design of the most economical building. As an example of the savings possible with the use of lightweight concrete, Mr. Best mentioned the General Petroleum and Prudential Insurance buildings in Los Angeles, where the saving in structural steel greatly offset the premium charged for lightweight concrete.

Do's and don'ts in the use of lightweight concrete, according to the speaker, were as follows:

(1) Never go to a job without knowing the weight per cu. ft. of the concrete.
(2) Be careful about outside storage of lightweight aggregate.
(3) Use of controlled amount of air-entraining agent is essential.
(4) Know your product, the specific gravity, weight and all other characteristics.
(5) Allow time for the dry aggregate to absorb water to avoid water grab.
(6) Work closely with a good testing laboratory.

Admixtures were discussed by Mr. Donovan, who advised all producers to be cautious in selling them. In some cases quality improvement is questionable. Do not oversell admixtures, he said, for many headaches will result, but on the other hand when quality will be improved, there should be no hesitancy about adding one. The advantage in using standard portland cement in preference to a blended air-entraining cement is of course, he said, that the amount of agent may be varied. Cements do vary, so tests should be run, he added. As for calcium chloride, the 2 percent used as an accelerator will not prevent concrete from freezing, and such concrete should receive normal care and protection, Mr. Donovan said. In conclusion, the speaker reiterated that every producer should know his materials to keep his product as uniform as possible.

Value of Advertising

Mr. Sundt raised the question—What is the value of advertising? Ready-mixed concrete producers can not follow large national advertisers' methods, and radio and newspaper advertising is not always successful. If advertising is undertaken, it should

Informal discussions were the rule, not the exception. Left: Fred Hammond, Lawton Transit Mix, Inc., Lawton, Okla., left, and Samuel F. Gehret, Camden Lime Co., Camden, N. J. Center: President-elect Richard K. Humphries, San Francisco, Calif., left, and vice-president Robert C. Collins, Philadelphia, Penn. Right: Gene A. Fehlig, Helena Sand and Gravel Co., Helena, Mont., left, and Herbert Rusk, Ready Mixed Concrete, Inc., Mansfield, Ohio

be done well. If no one in the producer's organization is competent to handle the merchandising program, then it should be taken to an advertising agency, Mr. Sundt said. Furthermore, the agency should not be hamstrung, by trying to accomplish a major program with little funds. Personal contact is still the most effective selling medium, according to the speaker. To sell the product, the producer must sell himself, then his ability to meet the customer's specifications. Most important of all are the company's own policies, the service to customers (Are your drivers courteous? Is your equipment clean and in good condition? Do you advise customers if an order is delayed? Mr. Sundt asked.) The customers will advertise these qualities to others, the speaker concluded.

Mr. Mumford continued on the subject of advertising. There is little glamor or sales appeal in concrete, yet a tremendous potential market remains to be exploited. No orders are going to come unless the producer asks for it, the speaker said. Therefore it is necessary for the producer to ask the customer to buy his product; he stresses his merits. The satisfied customer is a good salesman, Mr. Mumford also said.

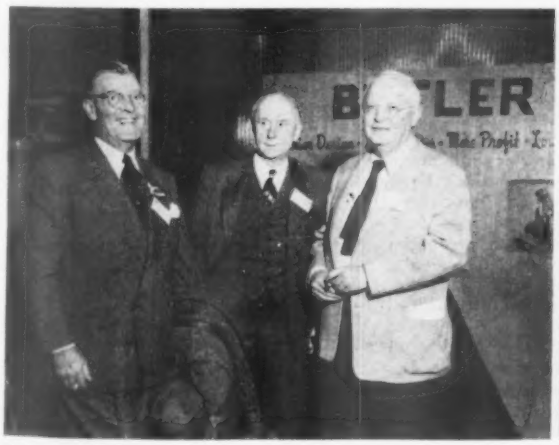
Advertising copy should be changed frequently. An ad should be placed in community papers to reach farmers. Copy should be kept short and varied. Other suggestions Mr. Mumford advanced were to promote the company name so the public will immediately think of that company in conjunction with concrete, and to exhibit at county fairs and home building shows. The use of give aways and literature, or anything to get the potential customer to stop at the exhibit, is well worthwhile, and much business can result from it. Another activity is to prepare a paper to be read before farmer's or property owner's groups. Also, visits to maintenance men and industrial engineers can give good results.

Lightweight Concrete

The question and answer period following the above talks brought many queries on lightweight concrete and strength specifications. A question about the use of vermiculite aggregate in transit-mixed concrete trucks brought the opinion that experience has shown the aggregate to be too friable sometimes to undergo truck mixing. Yield is lost, even with short mixing, Mr. Best said. Mr. Donovan answered that he has used much vermiculite concrete and has received no complaints about yield. Murray Simpson, Washington, D. C., also had received no complaints on shrinkage. He cautioned not to overmix. G. V. Lewis, W. E. Anderson Sons Co., Columbus, Ohio, gave his trick for mixing vermiculite concrete. At his plant, water, then cement, is charged into the mixer, followed by the vermiculite. As soon as batching is completed, the mixer is turned off, then mixed for 3 min. on the job. Good yields result, he said.

Selling on Bag or Strength Basis

V. M. Carr, Dolese Co., Oklahoma City, Okla., asked whether it was best to sell concrete on a bag basis or on a compressive strength basis. He said he used a guaranteed strength basis. This query brought a flood of opinions. J. F. Fisher, Superior Sand and



A large share of the producers spent their free moments in the exhibition hall. Left: (l. to r.) Robert J. Hummel, Consumers Co., Chicago, Ill.; Morgan Butler, Butler Bin Co.; and Irving Warner, Warner Co., Philadelphia, Penn. Right: A group of Ohio producers, l. to r., A. O. Powers, Donald C. Mell, Skip Mell, Mr. and Mrs. James Nicholson, and M. M. Mell

Robert Mitchell, chairman of the N.R.M.C.A. safety award session, is shown congratulating two of the men responsible for W. E. Anderson Sons Co. winning the Class A award in the N.R.M.C.A. safety competition. Left (holding the Pit and Quarry trophy) is Stewart B. Hinder, works manager, and at right is Norbert D. Eckert, safety director, of the Columbus, Ohio, company

Gravel Div., Phoenix, Ariz., felt it to be definitely advantageous to use a strength basis because of the better control resulting. Stanton Walker issued a warning about taking samples for strength tests, saying that few know how to get a good sample. Furthermore, what is the measure of a specimen reaching a desired strength? he asked. Then there is the problem of molding in a cylinder, how it is made on the job and transported, how it is capped and then how it is centered under the testing machine. No producer can guarantee that all test specimens will be of high strength, he said. Therefore, in Mr. Walker's opinion, producers should be careful of strength specifications.

When asked what he would recommend, Mr. Walker said he would be willing to operate under a strength specification if it were well drawn. A producer could be crucified some time if a good relationship does not exist between producer and customer. He also recommended minimum cement content and maximum water-cement ratio; then if testing is necessary to guarantee strength, it should be undertaken.

Mr. Carr related how his company will replace defective concrete if it does not meet strength specifications. He felt that this is a necessity for building a business on quality and service. He added that a product must be made worthy of selling if a reputable industry is to be built.

Mr. Collins suggested a prescription method by which the water and cement contents required to give a certain strength after 28 days are accepted by the customer, then the responsibility will be divided if failure occurs ("if the patient dies" in Mr. Collins' words).

A dissenting opinion was held by Mr. Best. Sell on a bag basis, he said, for when concrete is sold on a strength basis the producer is selling on the workmanship done by others. Mr. Sundt disagreed. He said he felt producers were hiding behind a cloak if they couldn't put out strength concrete, and something is wrong if they can't produce it. Failures may not be the producer's fault, but he will be blamed for them, he said.

G. E. Stein, J. L. Shiely Co., St. Paul, Minn., said that much variation in air content checked on each cement car load affected his strength basis. The air contents ran from 4-14 percent. Eric C. Ryberg, Utah Sand and Gravel Products Corp., Salt Lake City, Utah, said that control of the mix ends after it leaves the mixer. He would like to have samples taken at the central mixer. Mr. Fisher said that the sample should be taken on the job during the middle third of the pour. He has the job superintendent sign for additional water.

Alexander Foster, Jr., Warner Co., Philadelphia, Penn., described an English device used to determine water content in a mix quickly and easily.

He again pointed out how the Warner Co. sells concrete; it fills a prescription, with the water and cement specified as definite amounts. This caused difficulty on one job, however, when a cement supplier's strike made it necessary to change brands on the last 20 percent of the job. The cement content was limited by the specifications, with the result that strengths varied widely with different cements.

Stanton Walker closed the discussion by warning that a guaranteed strength specification is a contractual obligation, and should be administered as a legal document. However, the basis of promoting any concrete is for the producer to show that his concrete is the best, Mr. Walker said.

Presiding over the final meeting of the National Ready Mixed Concrete Association was Robert Mitchell. Two talks were presented at this meeting, one on admixtures for concrete by Delmar L. Bloem, assistant director of engineering for N.R.M.C.A., and one by Ralph H. Anderson, president, W. E. Anderson Sons Co., Columbus, Ohio, on "Why My Company Became Interested in Safety." In addition, safety trophies and certificates were presented to winning companies in the N.R.M.C.A. safety competition.

Election of Officers

Norman J. Fredericks, immediate past president of the association, officiated at the election. The slate presented by the chairman of the nominating committee, William Moore, was accepted. An amendment in the bylaws to substitute two vice-presidents for the secretary and vice-president formerly elected was also recorded. This step was taken to prevent confusion which had resulted in having both an elected secretary and the executive secretary, Mr. Ahearn.

The new president is Richard K. Humphries, San Francisco, Calif.; the two vice-presidents are Robert C. Collins, Philadelphia, Penn., and Herbert G. Jahncke, New Orleans, La.; Louis C. Shilling, Miami, Fla., is treasurer.

Directors elected to serve three years include C. H. Latham, The Lynn Sand and Stone Co., Swampscott, Mass.; Eugene Sundt, Albuquerque Gravel Products Co., Albuquerque, N. M.; L. T. McCourt, Fischer Lime and Cement Co., Memphis, Tenn.; C. P. O'Leary, Terre Haute Concrete Supply Corp., Terre Haute, Ind.; W. J. Hicklin, Capitol Concrete Co., Jacksonville, Fla.; and G. R. Bathe, Ready Mixed Concrete Co., Omaha, Neb. T. P. Eldred, Jr., American Hard Wall Plaster Co., Utica, N. Y., was elected to fill the unexpired two-year term of W. W. Nass, Syracuse, N. Y., who resigned.

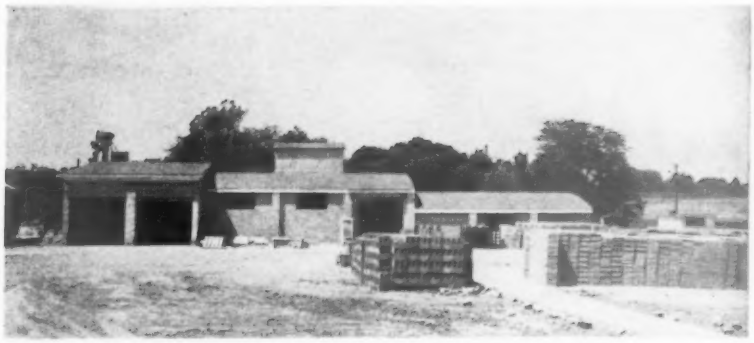
The executive committee consists of H. J. Brown, The Cook & Brown Lime Co., Oshkosh, Wis.; W. M. Keeler, Walt Keeler Co., Wichita, Kan.; Robert Mitchell, Consolidated Rock Products Co., Los Angeles, Calif.; and R. P. Mumford, The Beckley & Myers Co., Springfield, Ohio.

Admixtures

Mr. Bloem reviewed some of the work done by the association on the use of admixtures. Air-entraining agents improve durability, he said, but their primary disadvantage is a reduction in strength. Accelerators only increase the rate of strength development and do not act as an antifreeze, the speaker pointed out. Protection is still required against freezing. He then outlined some of the dangers accompanying the use of accelerators. Pozzolans were discussed, with particular reference to fly ash. A number of slides were presented showing the effects of adding fly ash by volume and by weight bases, and of the effects of different fly ashes.

(Continued on page 156)

BLOCK PLANT IN SMALL COMMUNITY



General view of plant and curing yard of Blue Lake Block Co.

BLUE LAKE BLOCK CO., Hopkinsville, Ky., is owned by Brents Thurmond and Hal Thurmond, who are also the owners of Russellville Concrete Products Co. of Russellville, Ky. The two towns are in the south central part of Kentucky and are the market centers for a rich agricultural section. From a rock products standpoint the area is noteworthy for the number of crushed limestone operations nearby — there are at least six small crushed limestone plants within a radius of 20 miles of Hopkinsville. Agricultural limestone plays an important part here.

Hopkinsville has a population of about 12,000, so when the Thurmonds decided to build a concrete masonry plant their idea was to have an efficient plant that could be geared to the growth of the community. Too large a capacity machine would be almost as inefficient as too small a machine. Simplicity in the operation was paramount, yet with room enough to expand as production needs required it. To fit the concrete masonry needs of the small community they selected a Gocorp "Prince." This is a fully automatic machine manufactured by Gene Olsen Corp. It uses a plain pallet and produces two standard 8's per cycle. It has a nominal capacity of 3200 standard 8's per ten-hour day.

In this type of machine the pallets are fed to a hopper in front of the machine and fed from there into the machine. The magnetic offbearer takes two empty pallets from the racks alongside the machine and replaces them with loaded pallets, making it possible for one man to run the machine.

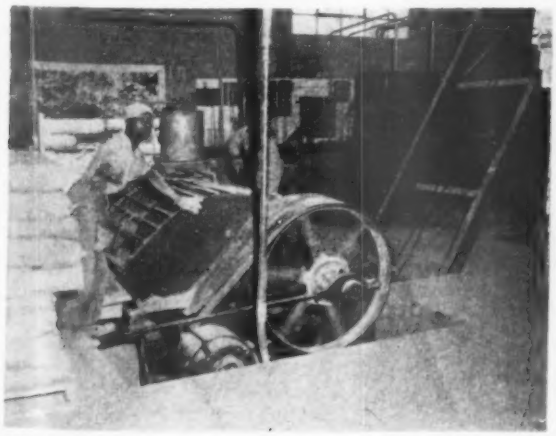
The plant is located about two miles north of Hopkinsville near an abandoned quarry. Limestone aggregates are used for the coarser sizes with Ohio river sand as the fine aggregate. Some limestone dust (up to 15 percent) is used as it makes a denser block and a more plastic mix. Some lightweight expanded shale aggregate (La-Lite) from the Lake City, Tenn., plant are used. (See "Tennessee Lightweight Aggregate Plant," ROCK PRODUCTS, June, 1951, page 103, for description of this new lightweight aggregate plant.)

The operation and handling of the aggregates is simple; hoppered-bottom cars unload to an open bucket elevator and the material is chuted to inside storage piles from which the aggregates are wheelbarrowed to a 25-cu. ft. mixer at floor level. A skip serves the block machine. Bagged portland cement from the Speed, Ind., plant of Louisville Cement Co. is used. The yard has paved lanes with a Hyster "40" fork-lift truck serving the block machine. Open air curing is practiced. The company plans to install steam curing facilities in the near future.

The company has been using Santomerse-S as an additive to the concrete. This product is made by Monsanto Chemical Co., Phosphate Div., St. Louis, Mo. About 8 oz. of the material is used for a 5-bag mix. It makes a smoother finish on the block with a denser texture. It also keeps the mixer cleaner and enables faster feeding of the mix. The additive also enables some speed-up of the machine cycle.

H. O. Anderson is superintendent of Russellville Concrete Products Co. and Lanice Futrell is superintendent of Blue Lake Block Co. Dick Hite serves both plants as salesman.

Hal Thurmond, one of the owners of Blue Lake Block Co., left, and Lanice Futrell, superintendent



Left: Bagged cement being unloaded into the 25-cu. ft. mixer. Right: The automatic block machine uses a plain pallet, which is fed to the front end of the machine, and produces two standard 8's per cycle

Block plant of Colby Construction Co. at Vineyard Haven, Martha's Vineyard Island

Colby Construction Co. produces sand and gravel, ready-mix and concrete products on Massachusetts island

By HUBERT C. PERSONS*

Diversification in a Restricted Market Area

TO MOST PEOPLE, a small island in the Atlantic Ocean would appear to be the last place in the world to locate a ready-mixed concrete business or establish a concrete products plant; nor would it seem any more attractive for a sand and gravel operation or a road building and general contracting firm. That would be the attitude of almost anybody but a dynamic New England Yankee like William A. Colby of Vineyard Haven, Mass. Mr. Colby has established all five of those lines of business on Martha's Vineyard, an island off the coast of Massachusetts, and is making money at it. This in spite of the fact that portland cement and all material except sand and gravel, and all equipment must come from the mainland by steamship or barge.

Mr. Colby's operations have come to mean so much to the welfare of the Vineyard that the islanders believe his name should go down in history along with that of Bartholomew Gosnold. Mr. Gosnold discovered Martha's Vineyard in 1602 and gave it a name. Mr. Colby "discovered" it only a few years ago and has given it concrete and a thriving industry based on that versatile construction material.

"The Colby Construction Co.," its go-getting owner explains, "not only has a concrete block and transit-mix operation together with a sand and gravel business, but we do all types of dock building, water front construction, excavating and road building and are now working on two road building contracts totalling $250,000.

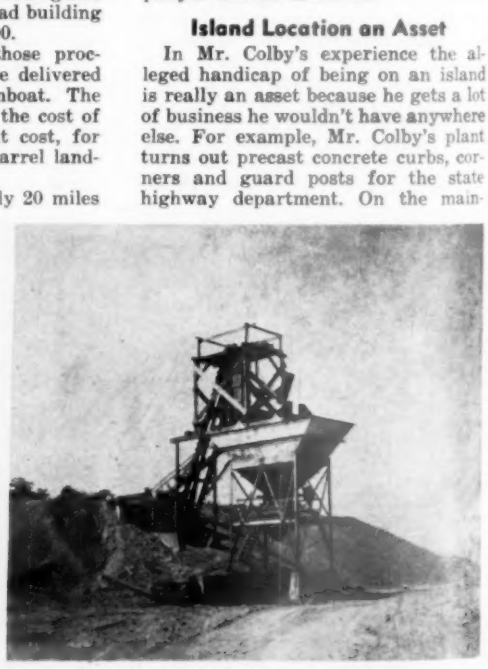
"All materials except those processed in our own plant are delivered either by barge or steamboat. The freight adds materially to the cost of our operations, our cement cost, for example, being $5.64 per barrel landed in our plant."

Martha's Vineyard is only 20 miles long and an average of 9½ miles wide, but that means a lot of shoreline which takes frequent lashing from destructive Atlantic storms. Repairing the ravages of storms is what brought Mr. Colby to the island originally. He was for a time a resident engineer on sea wall and jetty work. During World War II, Mr. Colby and his son, William, Jr., built small boats for the government. They still build pleasure boats and the five large boat sheds built before the war are used for boat storage during the winter as well as for the modern offices of the company's various activities.

Island Location an Asset

In Mr. Colby's experience the alleged handicap of being on an island is really an asset because he gets a lot of business he wouldn't have anywhere else. For example, Mr. Colby's plant turns out precast concrete curbs, corners and guard posts for the state highway department. On the main-

*Industrial public relations consultant, Chicago, Ill., for many years manager, Public Relations Bureau, Portland Cement Association.



Left: A 4-cu. yd. transit mixer at the cement chute. Right: Three compartment aggregate bin and batcher at the Colby plant

Colby Construction Co. crushing and screening plant

Scalping screen at pit used for screening road-mix gravel

land, the state of Massachusetts has these items made by prison labor, but freight costs to the island make it too expensive to ship them. Thus Colby Construction Co. gets this business which no private concern gets on the mainland.

There is also a big demand on the island for precast mooring block. Hundreds are used to anchor small craft and hundreds are buried or lost every winter when the big storms blow in. These precast mooring block require a cubic yard of concrete and are cast with a U-bolt in the top to facilitate handling with a self-powered crane, several of which are a part of the Colby equipment. The highway guard rail posts and the mooring block are cast and stockpiled at the plant during the winter when other work is slack.

Two Jaeger 4-cu. yd. transit mixers mounted on Autocar trucks are kept busy on concrete work for the state as well as for concrete footings, foundations, walks, drives and retaining walls all over the island. The batching plant is a 100-ton, three-compartment Heltzel, with bucket conveyor custom-built by Eastern Engineering Sales Co.

Gravel is crushed in three sizes. The crushing plant has a Traylor 47-in. reduction crusher with one sand bin, a three-compartment stone bin and a tailings bin with two conveyors, one 50 ft. and the other 110 ft. center to center. Other equipment in the sand and gravel plant includes a Seco single-deck scalping screen and a Kennedy triple-deck sizing screen.

Tongue-and-Groove Block

Mr. Colby's block plant is a matter of justifiable pride. His company has a franchise covering New England and a number of eastern states for the Hydro-Forge Speedblock, a tongue-and-groove block which is laid up without mortar.

"The Speedblock has proved extremely successful in our operations," Mr. Colby says. "There have been six houses built on the island using this block, besides innumerable foundations. It has been found that the labor costs of erection with these block is approximately 20 percent of the cost of laying up a mortar block wall. The joints are filled and the walls waterproofed using a Colorcrete material and machine. After the wall has been sprayed the joints are invisible. A plaster-like finish can also be given to the interior surface of the block walls by the same method."

Sand and gravel are used in making the Speedblock. No cinders or other lightweight aggregate are available. The block plant is equipped with an Appley-Yellen Hi-Speed block machine. Standard 8- x 16-in. block are made in 4-, 8- and 12-in. thicknesses. The block are air cured. Production is at the rate of 3500 block per day. Stockpiles of about 70,000 block are maintained for the summer building season. Mr. Colby estimates that approximately 1,000,000 concrete block are in service on the island and says he sells about 100,000 units a year, some being shipped from the island to points on the mainland as far as Connecticut, New Jersey and Long Island, N. Y.

A resident architect, Mr. Colby says, has begun to specialize in the design of concrete masonry houses, so he expects the use of his tongue-and-groove block to increase rapidly.

Colby Construction Co. is also the

A tongue-and-groove block is produced at the Colby plant

northeastern agent for the Mishco line of block machines, Chase block racks and pallets made by Commercial Shearing & Stamping Co., in addition to being agents for Colorcrete machinery and material.

Although Mr. Colby is a thoroughgoing concrete man, his company does asphalt paving for the state, Massachusetts road officials believing that a 2½-in. surface of mixed-in-place asphalt is sufficient for the light traffic over Martha's Vineyard roads.

Mr. Colby is the sole owner of Colby Construction Co. His general manager is Robert P. Goodale. William A. Colby, Jr., and Arthur Dickson are project foremen.

Block machine in operation

NEW MACHINERY

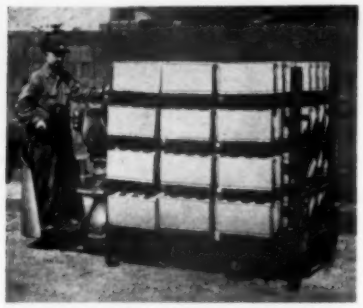
Gas powered fork lift truck with 63-in. mast

Gas Powered Truck

MOBILIFT CORP., 409 S. W. 13th Ave., Portland 5, Ore., has added a new "H" series to its line of gas powered trucks. The two model series consists of a 3000-lb. capacity "H" and the companion "HW" of 3500-lb. capacity. Both are stand-up type and are powered by the company's 3-cyl. air-cooled gas engine, with a governed speed of 6 m.p.h. Both of the new models are available with standard 63- and 83-in. masts.

Redesigned Industrial Trucks

TRUCK-MAN DIVISION, The Knickerbocker Co., 650 Liberty St., Jackson, Mich., has announced increased



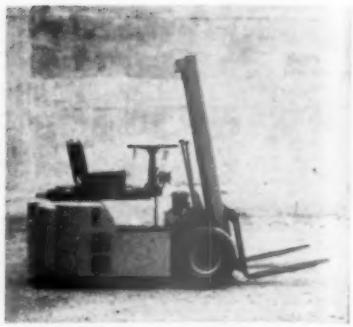
Industrial truck with increased horsepower

horsepower, from 4.4 to 5.8, for all models of the Truck-Man industrial truck. The greater power is the result of an increase in displacement from 13.5 to 17.8 cu. in. The trucks are manufactured in hydraulically operated skid-lift and pallet-lift models, utility and platform types, all with 360-deg. steering and pneumatic-tire drive wheels.

Continuous Mixer

THE KENT MACHINE CO., Cuyahoga Falls, Ohio, has developed a large continuous VoluMixer which is said to have a unique feeding system for both the aggregate and cement. The overhead concrete bin feeds directly into the hopper of the mixer, which is subdivided for coarse and fine aggregate. This aggregate is fed on a wide rubber belt and by adjusting the control gates it is possible to regulate the flow from the overhead silo. The mix is discharged directly onto a short belt conveyor which carries the material to a plain pallet block machine with automatic pallet return. This complete plant can be operated by one man.

Details of continuous mixer in action



Standard 2000-lb. capacity lift truck

Redesigned Lift Truck

HYSTER CO., 2902 N. E. Clackamas St., Portland 8, Ore., has announced engineering changes in its Model 20 lift truck which are said to permit more versatile use, and at the same time solve the problem of carrying around a heavy counterweight not normally needed on average jobs. New upright assemblies and load arm pins permit the use of optional additional counterweight on the standard 2000-lb. capacity model, thus increasing or decreasing load-center or load capacity as the need requires.

End-Mounted Vibrator

CANNON VIBRATOR CO., 1111 Power Ave., Cleveland 14, Ohio, has announced that a 5-in. vibrator has been added to its line of end-mounted "Quiet-Type" vibrators. Said to be the largest end-mounted pneumatic vibrator made, the EM-5-QH unit weighs 180 lb.; its 55-lb. piston has a stroke of 1⅝ in. and operates at a maximum rate of 650 strokes per min. at an operating pressure of 80 p.s.i. The body has a hard, chrome-plated cylinder wall, and the mounting plate has slotted bolt holes for quick mounting or removal.

Pneumatic vibrator weighing 180 lb.

BE SURE

your next truck mixer has ALL these 26 features...

FOR BIGGER PAYLOAD

1. The lightest weight*, complete, standard heavy-duty truck mixer.
   *3-cu. yd. Hi-Boy—5580 lbs.
   *4½-cu. yd. Hi-Boy—6830 lbs.

FOR BIG VOLUME PRODUCTION

2. Split-second charging through 32" unrestricted opening.
3. Fast discharge without segregation, even with zero slump concrete.
4. Blade system that discharges entire batch without residue.
5. Fastest and easiest control of discharge.
6. Higher discharge—no confining chutes.

FOR LOWER MAINTENANCE

7. Maintenance-free revolving hopper.
8. Hopper seal guaranteed for one year.
9. Easily replaceable mixing blades.
10. Extreme accessibility for maintenance or repair.
11. New silent, automotive transmission—the standard of comparison.
12. Double roller chain drum drive.

FOR BETTER, EASIER OPERATION

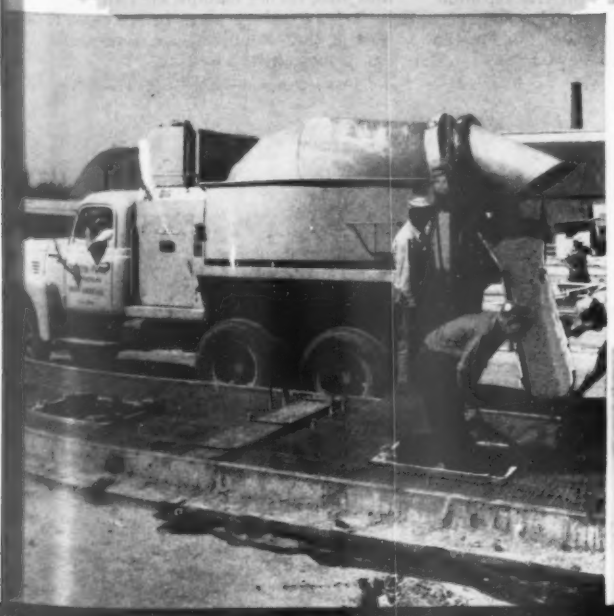
13. Single lever drum control operated from ground or walkway.
14. Single discharge control operated from ground or walkway.
15. Convenient quick visual inspection of batch before discharge.
16. Quick-opening inspection hatch.
17. Finger-tip control for reversing drum rotation.
18. Back-mixing if desired, with hopper in charging position.
19. 3-position, quick-acting, stainless steel water valve.

FOR GREATER EFFICIENCY

20. Complete end-to-end mixing, even of zero slump concrete.
21. Grout-proof automatic water nozzle, properly located.
22. All metal clutches running in oil.
23. Clutch controlled V-belt driven water pump.
24. 2-compartment, splash-proof, tilt-proof automatic water measuring tank.
25. 2-compartment flush tank.
26. Washout hose included.

GET THE BLAW-KNOX Hi-Boy LITE-WEIGHT TRUKMIXER

The Lightest Weight Heavy-Duty Complete Truck Mixer Available



You Ready-Mix operators know the profit-per-yard advantages of really lightweight truck mixer design . . . you can haul *maximum pay loads* with a lower over-all capital investment, less operating cost and without exceeding legal load limits. In addition, with the Hi-Boy Trukmixer you get all the fast charging and discharging advantages of the exclusive Revolving Hopper, plus the *guaranteed seal* which eliminates tail gate troubles and maintenance headaches.

ASK ABOUT THE *"Complete Package"* OF READY-MIX EQUIPMENT

The Blaw-Knox "Complete Ready-Mix Package" contains all the equipment you need for a profit-making ready-mix set-up . . . clamshell buckets, batching, mixing and charging plants, and Hi-Boy Trukmixers. Ask your Blaw-Knox distributor to explain the many advantages of getting the entire "package" from one dependable source.

BLAW-KNOX

BLAW-KNOX DIVISION of Blaw-Knox Company

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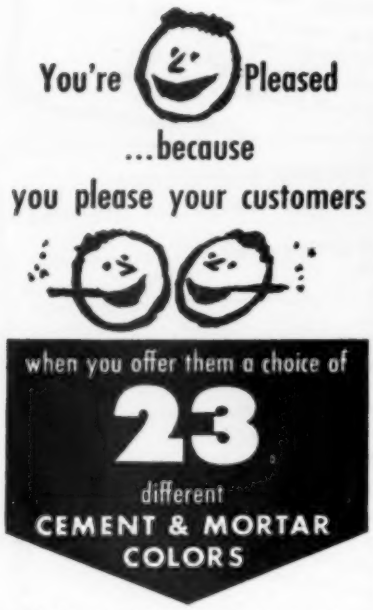


Made by Williams, this is the broadest selection of fine Cement and Mortar colors on the market. By offering your customers a choice of 23 shades, you can quickly and easily settle upon one having the exact chemical and physical properties your color specification requires.

Cement Colors by Williams

Here you have a choice of 18 shades—6 Reds, 3 Greens, 3 Browns, 3 Yellows, 1 Black, 1 Blue, and 1 Orange. Each shade is manufactured to meet the most exacting specifications for cement work—as recommended by the American Concrete Institute and the Portland Cement Association.

Mortar Colors by Williams

Here you have a choice of 5 different shades—one shade in double strength red, light buff, dark buff, chocolate and black. Each of these colors may be used with excellent results with any standard mortar mix or with a ready-made Bricklayer's Cement.

Write today for color samples and complete technical information on how Williams Cement and Mortar Colors give you superior results. Address Dept. 10, C. K. Williams & Co., Easton, Pennsylvania.

WILLIAMS
COLORS & PIGMENTS

C. K. WILLIAMS & CO.
East St. Louis, Ill. Easton, Pa. Emeryville, Cal.

Single-passenger truck with 6-cu. yd. mixer

Trucks and Mixers

COOK BROS. EQUIPMENT CO., 1815 N. Broadway, Los Angeles 31, Calif., is manufacturing Series M single passenger trucks, for dump bodies and crane mounts, and for truck-mounted concrete mixers. The M-310 three-axle truck with 6-cu. yd. mixer has a 163-in. wheelbase, and the M-36 two-axle truck with 4-cu. yd. mixer has a wheelbase of 145 in. Challenge mixers are now made in 3-, 3½-, 4-, 5-, 6- and 6½-cu. yd. sizes. The latest addition to the line is the 3½-cu. yd. unit designed for a two-axle truck.

Convertible Masonry Saw

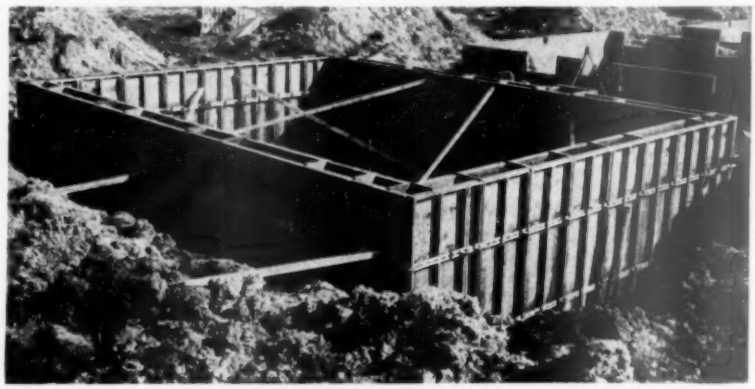
CLIPPER MANUFACTURING CO., 2800 Warwick, Kansas City 8, Mo., has announced that its Model HD masonry saw can now be converted to a concrete saw and a track saw. This unit, which is actually a wet and dry saw, can be converted at any time by placing the cutting head on a four-wheeled cart. The equipment is then ready for sawing concrete or asphalt patches or trenches in building floors, drives, etc. By placing this cart on tracks, stone slabs, precast concrete, plywood, masonite, etc., can be placed under the elevated tracks and sawed.

Lintel Molds

CONCRETE MOLD AND ENGINEERING CO., P.O. Box 801, Louisville 1, Ky., has announced the production of lintel molds, precision built heavy-duty all-steel molds which are said to produce a precast concrete lintel with a fine stone-like finish and with no ragged edges. These molds are of conventional size, 3⅝ x 7⅝ in., but other sizes are available in most cases without additional cost. By the use of adjustable spacers any length lintel can be made within the maximum mold length. The average mold weight is 12 lb. per lineal ft. which enables one man to handle them.

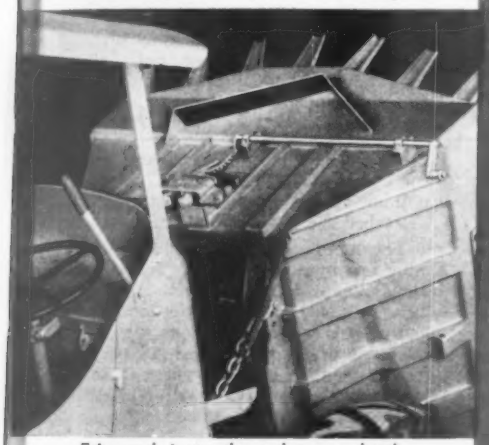
Concrete Forming System

ROCFORM CORP., 15160 W. Eight Mile Rd., Detroit 35, Mich., has introduced its system of forming and placing concrete, known as the Rocform method. The dominant idea of the method centers around light aluminum walers which are permanently attached to all panels. The company reports that standard clamps, tie rods and pins, corner clamps, etc., all quickly lock into the walers in seconds. It is said that Rocform basement forms can be set up in 2 to 3 hr.



Forms set up for placing concrete

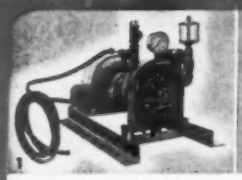
Dumptor body release lever is conveniently located alongside steering wheel . . . there's no reaching or stretching necessary . . . trip lever engages trip rod on body.



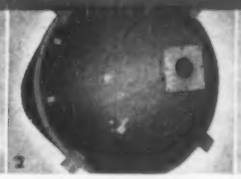
Trip rod instantly releases latch hooks from latch seat on chassis frame . . . and gravity dumps the load. Latch automatically locks as body returns to loading position.

Scoop-shaped Dumptor body rolls on heavy-duty rockers. Snub chains are attached to big, coil-spring shock absorbers, which check the body at approximate 70 degree tilt.

INCREASE BATCH PLANT PROFITS *with Johnson accessories*



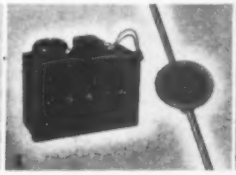
Rotary Vane Compressor gives 7 cu. ft. air pressure per min. cement aeration. 15-lb.-limit relief valve.



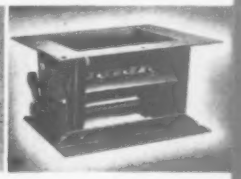
Aeration Fittings properly spaced in Johnson bins and silos keep cement free flowing.

2-Way Elevator Discharge Valve, a flap-type chute, directs flow of cement to the storage tank.

Pivoted Distributor feeds aggregates to bin sections. Positions and locks by ground control wheel.

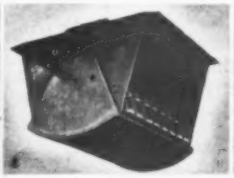


Bin Signals accurately register high and low levels in cement or aggregate. Dust-proof.



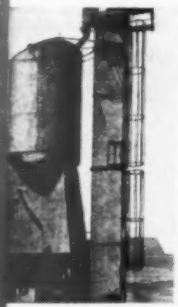
Rotary Plug Valve accurately controls cement flow. Plug operates freely in self-aligning bearings.

Receiving Hopper 30 and 50-bbl. sizes, feeds bulk cement to elevator. All-welded, weather-proof.



Aggregate Fill Valves single clam, radial type for jam-proof closing. Hydraulic pressure lubrication.

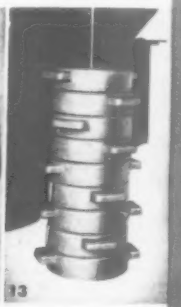
Tunnel Gate for stockpile reclamation. Single radial clam. Skirt board is hinged, opens and locks securely.



Safety Cage of 28" steel, welded to casing, can be furnished with all Johnson elevators.

Water Weigh Batchers, semi- or full-automatic types. 120 and 240-gal. sizes available.

Elevator Buckets in many sizes for aggregates, and cement. **Steel Chain** has carburized knuckles.



Batcher Test Weights in sets of nine, 50-lb. calibrated units, and two 25-lb. steel hangers.

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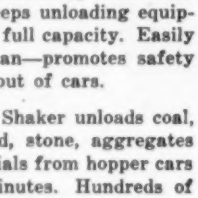
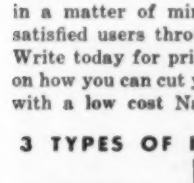
Saves up to 80% on unloading costs! Cuts labor costs and keeps unloading equipment operating at full capacity. Easily handled by one man—promotes safety by keeping labor out of cars.

The National Car Shaker unloads coal, coke, cinders, sand, stone, aggregates and all bulk materials from hopper cars in a matter of minutes. Hundreds of satisfied users throughout the country. Write today for prices and information on how you can cut your unloading costs with a low cost National Car Shaker.

3 TYPES OF INSTALLATION

Wheel Cart Shaker is easily wheeled into position and mounted on car.





Jib Crane Permanent crane swings shaker into position on car.

Mono Rail Shaker can be quickly moved from car to car.

National Conveyor & Supply Company

356 N. Harding Ave., Chicago 24, Ill.

N.R.M.C.A. Meeting

(Continued from page 146)

Plasticizing agents, such as ground limestone or diatomaceous earth, were mentioned. Their benefits are with lean concrete or where not enough fines are present in the mix. Other admixtures described were waterproofing agents, retarders and hardeners, all special types of admixes.

The questions brought up after Mr. Bloem's talk centered around the types of admixes to use. A question was asked whether there was any difference in action between $MgCl_2$ and $CaCl_2$. Mr. Bloem, on the basis of empirical data, believed not.

Safe Driving Program

The results of a four-year safe driving program were described by Mr. Anderson. The program was prompted by the occurrence of many on-the-road accidents and an impending insurance premium jump unless the record was improved. The record was improved by the following plan. The sum of $10 per month is paid to each man with an accident-free record for the month. The sum of $25 per driver is placed in a "Grand Fund" at the end of the year, which together with other monies accruing is distributed to the drivers at an annual meeting. The drivers are organized into teams, each with an elected captain, the purpose of which is to obtain a competitive spirit in striving for the lowest number of accidents during the year. The winning team receives additional money out of the Grand Fund.

Other points in Mr. Anderson's safety program include the setting up of a board of review to decide whether accidents are chargeable to drivers. The safety director goes to every accident to take pictures and gather information, following which a report is put on the bulletin board for all drivers to see. A monthly news letter is sent to the employe's home in which suggestions are given on good driving practices. A safety sticker is placed on the right hand door of each truck to attest to the driver's safety record; this sticker is changed weekly to include the new mileage traveled safely. Once a month a surprise truck inspection is made by the safety director and team captains. At that time $1 penalty charges are made against the $10 monthly safe driving awards for certain omissions, such as dirty license, fire extinguisher not full, flares and flags not in ready condition, and dirty and littered cab.

(Continued on page 161)

Wins Truck Mixer Contest

JOHN KNUDSEN, president of Knudsen Concrete Products Co., Dwight, Ill., was declared the winner of a contest sponsored by Chain Belt Co. for the naming of two new sizes of Rex Moto-Mixers. In an award ceremony held during the National Ready Mixed Concrete Association convention at the Conrad Hilton hotel in Chicago in February, Mr. Knudsen was presented with his prize; any two Rex mixers of his choice, valued up to about $16,000. The winning name was the "Adjusta-Wate," which in the opinion of Mr. Knudsen most clearly described the new equipment.

The naming contest had been running for three months prior to the National Ready Mixed Concrete Association convention and exhibition. The two new sizes of mixers are 5½- and 7-cu. yd. units, so designed, according to the winner on his entry blank, "with numerous ways of adjusting the weight on front and rear axles."

John Knudsen, center, winner of two truck mixers in naming contest, is congratulated by Robert Horton, left, midwest district manager of Chain Belt Co., contest sponsor, while George Hartley, Eighmy Equipment Co., looks on

(Continued from page 156)

The annual banquet is attended by all employes. Also invited are municipal and press representatives, as well as suppliers. The awards are presented at this time, apportioned according to the number of years of safe driving. These awards amount to a total of between $10,000 and $11,000, Mr. Anderson said. However, he considered the results well worth the expense, since the insurance premium has been reduced 18 percent, lost-time truck hours have been reduced tremendously, and property damage claims have all but been eliminated. The public appreciates the activity, according to Mr. Anderson, and the newspapers have given it favorable publicity.

The recommendations Mr. Anderson made regarding a safe driving program are: first, the person placed in charge of the plan must have specialized training in traffic problems (Norbert Eckert, who administers the Columbus company's plan, has had specialized traffic training in the Ohio State Highway Department and took a correspondence course on safe driving practices from Northwestern University, Mr. Anderson added); second, if a safe driving plan is to succeed it must be an integral part of the company policy and third, everyone must work at bringing about safe driving habits every day.

Safety Awards

Safety trophies, furnished by *Pit and Quarry*, were presented to the winners in the three classifications of the National Ready Mixed Concrete Association safety competition. The Class A winner—100,000 cu. yd. or more—W. E. Anderson Sons Co., Columbus, Ohio; Class B—50,001-100,000 cu. yd.—Eugene Sand & Gravel Co., Eugene, Ore.; Class C—50,000 cu. yd. or less—Standard Roofing & Material Co., Tulsa, Okla.

Pipe Handbook Published

Concrete Pipe Handbook, 488 pp., American Concrete Pipe Association, 228 N. LaSalle Street, Chicago, Ill., 1951, $4.

THIS HANDBOOK, prepared by the American Concrete Pipe Association, contains engineering data and technical information pertaining to concrete pipe which are not readily available and which have now been collected into one volume. Since construction practices vary and it was impossible to present all methods, an attempt was made to present the most acceptable method.

The well-illustrated book contains 13 chapters plus an appendix containing A.S.T.M. and A.A.S.H.O. specifications pertaining to concrete culvert and sewer pipe.

Introductory chapters describe uses and manufacture of concrete pipe and specifications and tests. One complete chapter is devoted to bedding and backfilling trench conduits and

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Concrete Products Mishawaka, Ind.
De Yorgi Bros. Bronx, N. Y.
Economy Coal & Building Materials Co. Waukegan, Ill.
Erie Builders Supply Co. Erie, Penna.
Faber Cement Block Co. Paramus, N. J.
Hain Bros. Inc. So. Norwalk, Conn.
Imperia Bros. Pelham Manor, N. Y.
Lake Shore Cement Products Michigan City, Ind.
Mackay Trucking Corp. New York, N. Y.
Massachusetts Cement Block Co. Medford, Mass.
Milford Concrete Products Milford, Conn.
Multiplex Concrete Co. East Orange, N. J.
Oliver Manufactoring Co. Rahway, N. J.
Picone Bros. Farmingdale, L.I., N.Y.
Plasticrete Corp. Hamden, Conn.
J. Rappoli Co. Medford, Mass.
Waterbury Ready Mixed Concrete Co. Waterbury, Conn.

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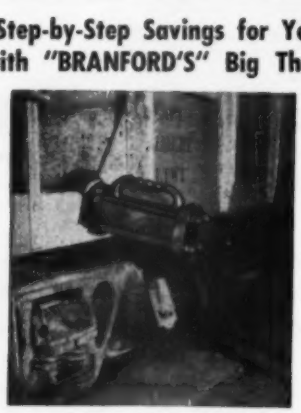
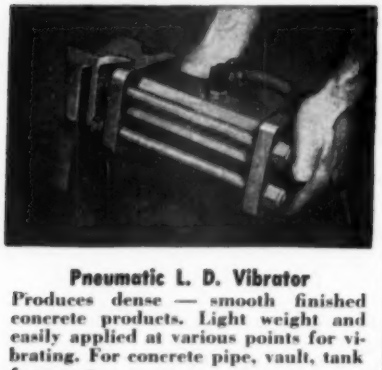


Pneumatic Car Shake-Out Vibrator
Low cost portable shake-out speeds up unloading of cement and other bulk materials from covered hopper-bottom railroad cars.

Pneumatic Hopper and Bin Vibrator
Assures instant, steady flow of materials from storage bins, weigh batchers, and feed hoppers. Destructive hammering is eliminated.



Pneumatic L. D. Vibrator
Produces dense — smooth finished concrete products. Light weight and easily applied at various points for vibrating. For concrete pipe, vault, tank forms, etc.

Wide range of sizes and styles. Let us quote you on your vibrator needs.
Complete catalog on request.

NEW HAVEN Vibrator Company
145 CHESTNUT ST.
NEW HAVEN, CONN.

culvert pipe in embankments, as well as recommended depths of trench. Recommended depths of cover are given in tables and graphs.

Perhaps the most extensive chapter in the book is the one on loads on underground concrete conduits. It is divided into three parts: loading and bedding, trench conduits, and embankment conduits. The chapter reviews some of the Iowa State College research on underground concrete conduits and is confined to a consideration of the loads to be expected on concrete pipe conduits as a result of fill material used in backfilling the trench or in building the embankment and also as a result of the type of bedding used. It does not deal with semi-flexible or flexible conduits, superimposed loads, live loads, impact, or the problems of minimum cover conditions. Nor does it deal with the supporting strengths of conduits. These items can all be found in reports of the Iowa State College investigations. Numerous diagrams, charts and tables are included as well as examples of how to apply Marston's formula and the Iowa State theories.

A brief review of the theory of the flow of water through conduits is presented and the formulas for flow in pipe and channels are given and explained, as well as numerous discharge charts.

A chapter is devoted to Talbot's formula for runoff and another to hydraulic coefficients of flow. Concrete pipe sanitary sewers receive considerable attention, both design and construction. Effects and characteristics of various types of sewage are also discussed. Jacking reinforced concrete pipe lines is described. A chapter is also included on concrete pipe culverts.

Septic Tanks Booklet

"SEPTIC TANKS—Their Use in Sewage Disposal," is a booklet just published by the Housing and Home Finance Agency, containing information on the efficient design and operation of individual household sewage disposal systems, based on current research undertaken cooperatively by the agency and the U. S. Public Health Service of the Federal Security Agency. Research findings include data on septic tank compartmentation; inlets, outlets and intercompartment appurtenances; percolation test methods; absorption systems; and soil clogging effects of septic tank effluents. The booklet is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., for $0.15.

Perlite Mix Standards

THE PERLITE INSTITUTE recently completed a series of five recommended standard mixes for lightweight insulating perlite concrete, which are given in the accompanying chart. This is the first time the joint experience and technical knowledge of mix ratios, water-cement ratios, air-entraining qualities, etc., have been established. An architect can now determine from the chart what wet density, as placed, will develop the desired insulation value. The contractor can now determine how much cement, perlite, gallons of water and air-entraining agent are required for each cubic yard of placed concrete. The designer may know in advance what the weight of the dry concrete will be and also its strength.

The Perlite Institute pointed out, however, that a sense of departure must be recognized when perlite concrete is compared to sand and gravel concrete as they do not compete in the same field. Where the designer is accustomed to specifying a compressive strength of 2000 to 4000 p.s.i. for concrete used as footings, retaining walls, columns, bridges, etc., perlite concrete is not applicable. On the other hand, it was stated, where lightweight, fire resisting, insulating concrete is desired—such as roof and floor fill, radiant subfloor slabs, fireproofing, curtain walls, partition or wall masonry units, or roof decks on short spans between steel joists—here is the field for perlite concrete.

* DRY CONCRETE PROPERTIES			MIX PROPORTIONS BY VOLUME					MATERIALS REQUIRED FOR ONE CU.YD. OF PLACED CONCRETE			
DENSITY LB./CU.FT. (OVEN DRY)	COMPRESSIVE STRENGTH (PSI. AT 28 DAYS)	THERMAL CONDUCTIVITY "K"	CEMENT (SACKS)	PERLITE (CU.FT.)	WATER (GAL. PER SACK CEMENT)	AIR-ENTRAINING AGENT (PINTS)	* WET DENSITY AS POURED (LB./CU.FT.)	CEMENT (SACKS)	PERLITE (CU.FT.)	WATER (GAL.)	AIR-ENTRAINING AGENT (PINTS)
35	490	0.93	1	4	9	1	49	6.50	26	58 ½	6 ½
29	280	0.77	1	5	11	1 ¼	42 ½	5.20	26	57	6 ½
26	220	0.70	1	6	13	1 ½	40	4.33	26	56 ½	6 ½
23 ½	160	0.65	1	7	15	1 ¾	38	3.70	26	56	6 ½
21 ½	125	0.62	1	8	17	2	37	3.25	26	55	6 ½

* BASED ON AVERAGE AGGREGATE DENSITY OF 8 LB./CU.FT. STRENGTH DATA BASED ON A.S.T.M. TYPE I PORTLAND CEMENT. FOR HIGHER EARLY STRENGTHS, USE A.S.T.M. TYPE III PORTLAND CEMENT

Typical mix designs for lightweight insulating concrete. Other desired properties of strength, insulation and density may be obtained by varying proportion of cement, air entrainment, or addition of supplementary aggregates. The Perlite Institute recommends that for best results the following mixing procedure should be followed: (1) put required amount of water and air-entraining agent in mixer; (2) add portland cement and mix to uniform slurry, usually about ½ minute; (3) add perlite aggregate and mix until desired workability is obtained, usually about 2 minutes

Correction

DUE TO A proofreader's error in the article, "Vacuum Processed Lime Putty," published in the January, 1952, issue of ROCK PRODUCTS, an erroneous figure was published having to do with the lime solids content in lime putty. The error occurred on page 240, in the second paragraph of the middle column. That sentence should have read: "It was difficult to produce a lime putty having better than 35 percent lime solids, even when drawn from the most favorable spots in the aging tanks, and there would be variations down as low as 25 percent."

Another Zoning Reverse

MASON CONCRETE PRODUCTS Co., Leesburg, Fla., lost its battle with the city zoning commissioners to have property at the rear of its plant rezoned from residential to industrial, to provide room for expansion.

The property on which the company was established was rezoned to industrial during World War II, but surrounding property is still zoned residential. Recently the company purchased an adjacent lot, 220 x 400 ft., for expansion purposes. Objections by neighbors in that area have prevented rezoning action by petition. An editorial in a local newspaper, in behalf of the firm, stated, "It does not seem right for a business doing $140,000 a year in Leesburg to have to close its doors or curtail its operations because of this property mentioned." All efforts by the company, and in behalf of the company, met with no avail.

Mason Contractors' Convention

S. H. WESTBY, assistant manager of the Portland Cement Association's Housing and Cement Products Bureau, Chicago, Ill., was one of the principal speakers at the annual combined convention and exhibit of the Mason Contractors' Association of America, Inc., held at the Palmer House, Chicago, Ill., February 24-27.

As a specialist in concrete masonry construction, Mr. Westby spoke on "A Modern Approach to Concrete Masonry." Highlights of the talk in-

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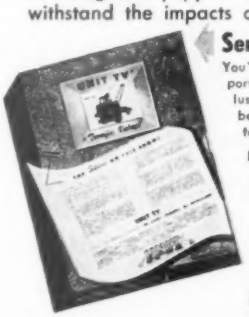

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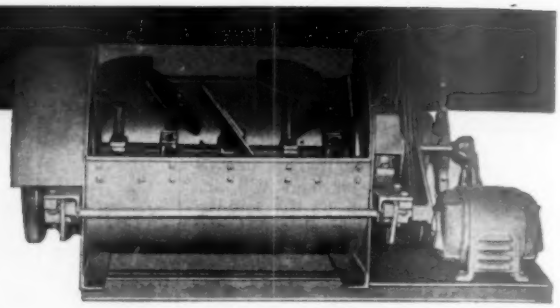

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Many *Multi-Blade Mixers*, in standard sizes from 3 to 60 cubic feet, are in stock for immediate delivery. All models may be had mounted on rubber tired steel trucks. Discharge door may be in the rear, either end, or bottom, or in more than one location, as desired.

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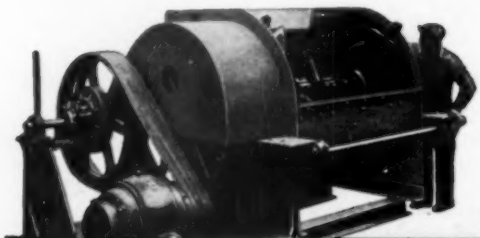

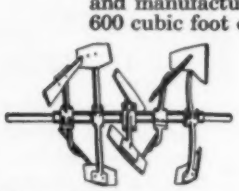

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cluded a discussion of the method by which modern planning minimizes costly cutting and fitting of masonry units in walls. Other points included the importance of using dry block; the protection of block and unfinished walls against moisture at the job site; advice that concrete block are never to be pre-wetted before application of mortar; and the use of control joints and their construction. He supplemented his discussion with a series of slides on concrete masonry construction.

Other speakers at the convention included Edward P. Morgan, director of enforcement, Office of Price Stabilization, who spoke on "O.P.S. Construction Regulations and How They Are Being Enforced;" Douglas Whitlock, general counsel, Structural Clay Products Institute, Washington, D. C.; Harry C. Bates, president, Bricklayers, Masons and Plasterers International Union of America, Washington, D. C.; Robert Taylor, research director, Structural Clay Products Research Foundation, Washington, D. C. and Chicago, Ill.; and Edward G. Gavin, editor, *American Builder Magazine*, Chicago, Ill.

The M.C.A.A. exhibit, held in conjunction with the convention, showed the newest types of products and equipment, including scaffolds, masonry saws, mixers, masonry cements, glass block, brick, tile, concrete masonry, hoists, heaters, instruments and material handling equipment.

Concrete Short Course

THE SECOND ANNUAL quality concrete short course was held at Georgia Institute of Technology, Atlanta, Ga., February 4-6, 1952. The course was divided into two sections, one section primarily for ready-mixed concrete operators, engineers, architects and contractors; the other, primarily for concrete masonry and pipe manufacturers. The course was also designed to allow each participant to spend a day in the laboratory, making actual tests and determining correct weights and volumes of materials for obtaining a specified concrete.

The instructors for the course included Blake R. Van Leer, president of Georgia Institute of Technology, and staff from the School of Civil Engineering; R. E. Copeland, director of engineering, National Concrete Masonry Association; John G. Hendrickson, director of engineering, American Concrete Pipe Association; Carl A. Menzel, E. C. Wenger and D. L. Chaney, Portland Cement Association.

Among the subjects covered in the short course were: problems and future of concrete; quality concrete as required by the architect; quality concrete as required by the engineer; specifications; testing of materials for plant use; principals of mix design; curing and drying; concrete masonry wall design; construction details and practices; design and control of concrete mixtures; road and street construction practices; and de-

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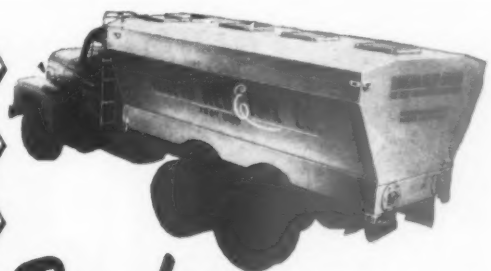

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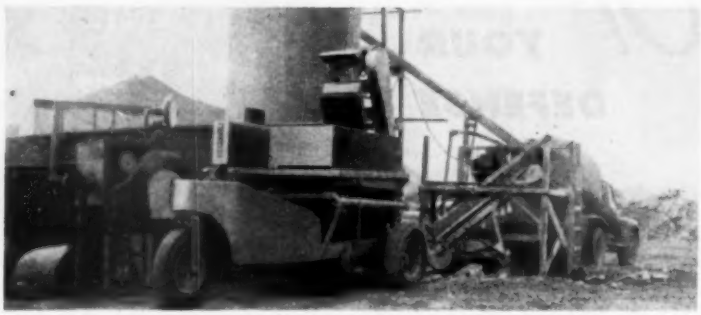

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sign and construction of drainage systems.

Cooperating agencies for the short course were: American Concrete Pipe Association; National Ready Mixed Concrete Association; Portland Cement Association; National Concrete Masonry Association; Georgia Concrete Pipe Manufacturing Association; Atlanta section of the American Institute of Architects; Georgia section of the American Society of Civil Engineers; Georgia section of the Associated General Contractors; Georgia Engineering Society; Georgia Society of Professional Engineers; Atlanta post of the Society of American Military Engineers; and the School of Civil Engineering, Georgia Institute of Technology.

Supply Service

REARDON INDUSTRIES, INC., Cincinnati, Ohio, manufacturer of concrete chemicals and concrete colors, has announced a new supply service for builders and contractors.

To make all items available, in any quantity, Reardon Industries has compiled a complete file of technical data and detailed information on every item it produces, into a file-size catalog. Instead of stocking the items, the dealer need only refer to the catalog listing and phone the nearest Reardon plant (Cincinnati, Ohio, or Houston, Texas) and the product will be delivered by overnight truck delivery.

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Lightweight Aggregate

A LIGHTWEIGHT AGGREGATE for concrete, using clay as the raw material, is being produced jointly by three Detroit, Mich., concrete block firms for use in masonry products.

In the Detroit area, cinders formerly have been the primary source of lightweight aggregates, but with the substitution of powdered coal for fuel by some of the large plants, cinders of the required quality for aggregates are short in supply. As a result, product manufacturers started a search for a good manufactured lightweight aggregate that could be produced from local materials.

Three years ago, Standard Building Products Co., Friendship Block & Brick Co., and Sona Cement Products Co., all of Detroit, made a contract with Besser Manufacturing Co., Alpena, Mich., for construction of a plant at nearby Livonia. A straight-line sintering furnace was built by the Besser company to produce approximately 600 cu. yd. of lightweight aggregates daily. After three years of experiment and development, an aggregate known as Beslite is now being produced. The Livonia plant represents an investment of approximately $750,000.

Texas Industries Expansion

TEXAS INDUSTRIES, Dallas, Texas, has bought Builders Supply, Inc. and Texcrete of the Valley, both at Pharr. At the same time Texas Industries increased its interest in Texcrete Co. of Dallas and Fort Worth to 100 percent and acquired total holdings in the two-kiln lightweight aggregate plant at Rosenberg formerly owned by the Herculite Corp.

The Pharr subsidiary is a complete manufacturing and sales unit in the widespread Texas Industries operations. Builders Supply manufactures lightweight concrete block and other precast masonry units while Texcrete is its sales agent for the entire Lower Rio Grande Valley area. A. J. Clark, who founded and operated Builders Supply, will be manager of the new owner's Pharr interests. He has been elected a vice-president of Texas Industries.

The organization was originally chartered as the Texas Lightweight Aggregate Co. in 1946. The present expansion program was started in August, 1950, when Ralph B. Rogers, now president of the company, became chairman of the board of directors. The name of the firm was changed to Texas Industries, Inc., on September 1, 1951.

C. B. ROLPH, Luverne, Minn., is building a new ready-mixed concrete plant and adding two transit-mix trucks for his operations. The old plant is being moved to Adrian, Minn., and will be operated under the name of Adrian Ready Mix Co.

Be sure your truck mixers wear the Badge of Dependability

Anyone can attempt to build a truck mixer. But the "know how" of years assures you that mixers and agitators built by Truck Mixer Manufacturers Bureau members, to Bureau standards, will meet your profit requirements as successfully as they meet the quality requirements of architects and engineers.

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Equally remarkable, concrete is poured in many batches, each composed of innumerable particles of aggregate and cement. Yet architects and engineers depend on it to produce homogeneous structures, *which it does, provided all batches have been properly and completely mixed.*

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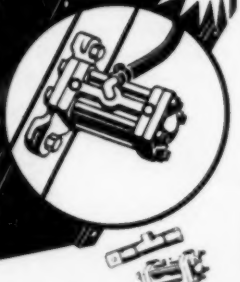

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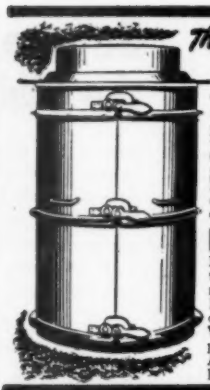

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